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ABSTRACT

This curriculum guide, the third volume of the series, outlines the basic program of vocational agriculture for Louisiana students in the ninth and tenth grades. Covered in the five units on plant science are growth processes of plants, cultural practices for plants, insects affecting plants, seed and plant selection, and diseases that affect plants. Dealt with in the five units on animal science are types, breeds, and origins of livestock and poultry; methods of evaluating livestock; diseases and parasites of livestock; nutrition of livestock; and principles of breeding livestock. Each instructional unit contains some or all of the following: student objectives, suggested review teaching materials, lists of materials and audiovisual equipment needed to complete the lesson, pertinent field trip activities, student motivation techniques, an outline of the content of the lesson, student activities, study questions, transparency masters, and information sheets. (MN)

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STATE OF LOUISIANA

DEPARTMENT OF EDUCATION

BULLETIN 1690-III

THE BASIC PROGRAM OF VOCATIONAL AGRICULTURE IN LOUISIANA
AG I and AG II
(9th and 10th grades)

[redacted]

Spring, 1983

Office of Vocational Education

N. J. Stafford, Jr., Ed.D.
Assistant Superintendent

J. KELLY NIX
STATE SUPERINTENDENT

U.S. DEPARTMENT OF EDUCATION
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FOREWORD

This curriculum guide is a result of extensive work on the part of numerous agricultural educators. The materials included here were developed for the express purpose of aiding secondary vocational agriculture teachers. The hope is that by having practical and usable teaching materials in their hands, teachers will be able to make improvements in their instructional program as well as have increased time available to spend on other phases of the total vocational agriculture program.

I wish to express my personal gratitude and that of the Department of Education to each vocational educator whose efforts and expertise were contributed throughout the development of this curriculum guide. The results of your efforts will significantly benefit vocational agriculture teachers and students in Louisiana.

J. KELLY NIX
State Superintendent
Department of Education

ACKNOWLEDGEMENTS

This publication represents the cooperative efforts of personnel in the Department of Vocational Agricultural Education, Louisiana State University and the Vocational Agriculture Section in the Office of Vocational Education, Louisiana State Department of Education. Special recognition goes to Dr. Michael F. Burnett who served as project director in the development of the guide. Special commendation goes also to members of the writing team who worked diligently to make this publication a reality.

Other highly significant contributors to this project include: Dr. Charles W. Smith, Dean of the College of Education, Louisiana State University, who initiated this project and served as its director during the early stages;

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A special acknowledgement to the Curriculum Materials centers at AAVIM (American Association of Vocational Instructional Materials), Texas A&M University, and Oklahoma State University. These centers made numerous contributions to this project by allowing relevant materials already in existence to be freely adapted for use in this curriculum guide.

The following Louisiana Vocational Agriculture Teachers gave freely of their valuable time to serve on the curriculum review panel.

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	TOTAL	20 hours	17 hours

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ANIMAL SCIENCE
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	TOTAL	24 hours	15 hours

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT I: Growth Processes of Plants

LESSON 1: Structure and Physiology of Plants

I. Preparation for Instruction

   A. Student Objectives

      1. Terminal: Explain the importance of plants and identify parts of a plant and their functions.

      2. Specific:

         a. Define new plant science terms.
         b. List the top ten money crops in Louisiana.
         c. List four reasons why plants are of physical importance.
         d. List the parts of the plant and identify their functions.
         e.

         f.

         g.

   B. Review Teaching Materials

      1. Reiley, H.E. and C.L. Shry, Jr. *Introductory Horticulture*. Delmar Publishers, Inc., Albany, N.Y., 1979. Unit 2.

      2. "Agricultural Summary for Louisiana," LSU Cooperative Extension Service, 1980 and each year.

   C. Special Arrangements

      1. Materials

         a. Plants with all parts

         b. Fibrous root and tap root

        c. Unusual leaves (pine, onion, schefflera)

        d. Plants with stored food (potato, beet, celery, turnip)

        e. Samples of natural fabrics (cotton, linen)

        f. Parallel veined leaves (grasses, corn) and net-veined leaves (trees and shrubs)

        g. Display materials -- poster boards, markers, rubber cement, plant specimens

    2. Travel

        a. Student interviews with major crop producers

        b. Student surveys of plant science enterprises

    3. Audio-visual equipment -- overhead projector/transparencies

II. Presentation of Lesson and Suggested Student Activities

  A. Motivation

    1. Discuss economic importance of crops to Louisiana and to local area (refer to Louisiana Agriculture Summary, LSU Cooperative Extension Service).

    2. Discuss importance of plants in terms of food, shelter, and environmental quality and how plants affect our daily lives.

    3. Display samples of natural fibers (cotton, linen, silk, hemp and grass cloth).

    4. Demonstrate transplanting of a plant with a tap root and a plant with a fibrous root system, keeping the roots and the soil as intact as possible.

    5. Display complete plants with all parts labeled.

B. Content Outline

1. Terms

   a. Environment -- all of the surrounding conditions and influences that affect the development of a living thing

   b. Photosynthesis -- process by which carbon dioxide and water in the presence of light are converted to sugar and water

   c. Nutrients -- plant food elements

   d. Root tip -- protective area at the end of the root

   e. Root hairs -- microscopic root-like extensions that absorb water and minerals from the soil

   f. Transplant -- to move plants from one location to another

   g. Fibrous roots -- mass of roots all about the same size and depth in the soil

   h. Transpiration -- giving off water in vapor form

   i. Respiration -- the leaves of plants absorb oxygen and give off carbon dioxide. Energy is released in the cells when glucose is degraded or split.

   j. Tap root -- one central root with many branches

   k. Pollen -- male sex cells in plants

   l. Pollination -- first step in sexual reproduction involving male and female parts

   m. Chloroplasts -- small green particles containing chlorophyll found in leaves

2. Importance of Plants

4

a. Economic Importance -- Louisiana crops in order of monetary importance in Louisiana

  1) Forestry
  2) Soybeans
  3) Rice
  4) Cotton
  5) Sugarcane
  6) Home vegetable gardening
  7) Ornamentals
  8) Sweet potatoes
  9) Horticultural crops (commercial vegetables)
  10) Pecans

  Discuss crops grown in local area and importance of the crop to the economy of the community.

  1) What crops are grown?

  2) What jobs are related to crops?

  3) Why are some crops unsuccessful?

b. Physical Importance of Plants -- without plants, life on earth could not exist.

  1) Food:
  Since plants are a primary food source for animals and humans and more people begin to grow their own food, we need to better understand plant functions.

  2) Shelter:
  Trees provide the material to build our homes and the fuel to heat them. Trees and plants also provide shelter for wild animals in our forests and woodlands.

  3) Environment:
  Plants produce oxygen which is essential to all animals. In areas where there are more cars, buildings, and people than trees and grass, there is less oxygen and more pollution.

4) Clothing:

Two fabrics are made from plants. They are:

a) Cotton -- from the cotton boll fibers, and
b) Linen -- from the flax plant.

3. Parts of a Plant

Most plants are made up of four basic parts: leaves, stems, roots, and flowers or fruit. Each part has one specific function or may have several functions. (Transparency I-1-A)

a. Leaves

1) External:

Leaves vary a great deal according to the needs of the plant. They can be single, compound, needle-shaped like pine trees, or cylindrical like an onion. They can also be long and thin or short and wide. Leaves usually have two parts:

a) the petiole or leaf stalk.
b) the blade which is usually the flat part.

They all have veins and midribs. Most trees and shrubs are net-veined while corn and grasses are parallel veined. (Transparency I-1-B)

2) Internal:

In the center of the leaves are the food-making cells. These cells contain chlorophyll which gives plants their green color. After the food-making process, called photosynthesis, the manufactured food moves from the leaves down the stem toward the roots. It can be stored here for later use. Some common examples of stored food are potatoes, onions, garlic, beets, and carrots.

b. Stem

Stems have two main functions:

1) The movement of water, minerals, and food throughout the plant, and

2) The support of leaves and reproductive structures.

Green stems can manufacture food as do the leaves and store food for later use by the plant. Examples are Irish potatoes, asparagus, and celery.

c. Roots

Roots have three main functions:

1) To anchor the plant and keep it upright,

2) To absorb water and minerals from the soil and conduct them to the stem, and

3) To store large quantities of food.

Roots have a root cap that protects the root as it pushes through the soil in search of nutrients and water. The root hairs help to absorb moisture and nutrients. They are located just behind the root cap. The root hairs are microscopic so we must be careful not to damage them when transplanting or cultivating. (Transparency I-1-C)

There are two types of root systems:

1) The fibrous root system, and

2) The taproot system.

Fibrous roots tend to be smaller and more spread out. They grow closer to the surface and tend to interlock with each other to form a mass of tightly woven soil and roots. This is why grasses hold the soil in place so well.

Taproots have one main root that goes deeper into the soil with smaller roots branching from the larger ones. Trees, shrubs and some crops have taproots. (Transparency I-1-D)

Fibrous roots are less likely to be damaged by transplanting because less digging is required to remove plant from the soil.

d. Flowers, Fruit and Seeds

1) The main function of the flower is for plant reproduction.

Flowers serve another purpose besides adding beauty to our landscapes and providing a source of income for our florists; they attract insects by their bright colors. The insects are necessary for the spreading of the pollen, which appears as a yellow powder, necessary for sexual reproduction. The process of spreading pollen from the male to the female parts is called pollination. Sometimes farmers will encourage bees to live around their fields by providing bee hives for them in order to pollinate their crops.

2) Fruit and Seeds

After pollination, the fruit begins to develop. The fruit of plants can be in many shapes, sizes, and forms. We commonly think of apples, pears, and bananas, but the fruit of a plant can also be the pea pods, the seed heads of grasses, or the watermelon. Seeds are usually formed inside the fruit. Seeds are harvested commercially and taken from the fruit, or they can be spread by birds and wild animals.

C. Student Activities

1. Have each student collect a different type of plant small enough to fit on the poster board. Have them mount the plants to the boards and label each part. Be sure to include plants with modified parts such as celery, onions, etc. Encourage collecting plants with all parts. Display posters.

2. Have students make a survey in their local area of plant science enterprises. These could include farms, processing plants, cooperatives, etc. Have them include in their reports environmental factors, marketing conditions, and labor availability that influence the crop's success in the area.

3. Have students interview producers of major crops. They should include job opportunities and training required to work in crop production enterprises.

D. Suggested Study Questions

1. Define the terms found in the lesson.

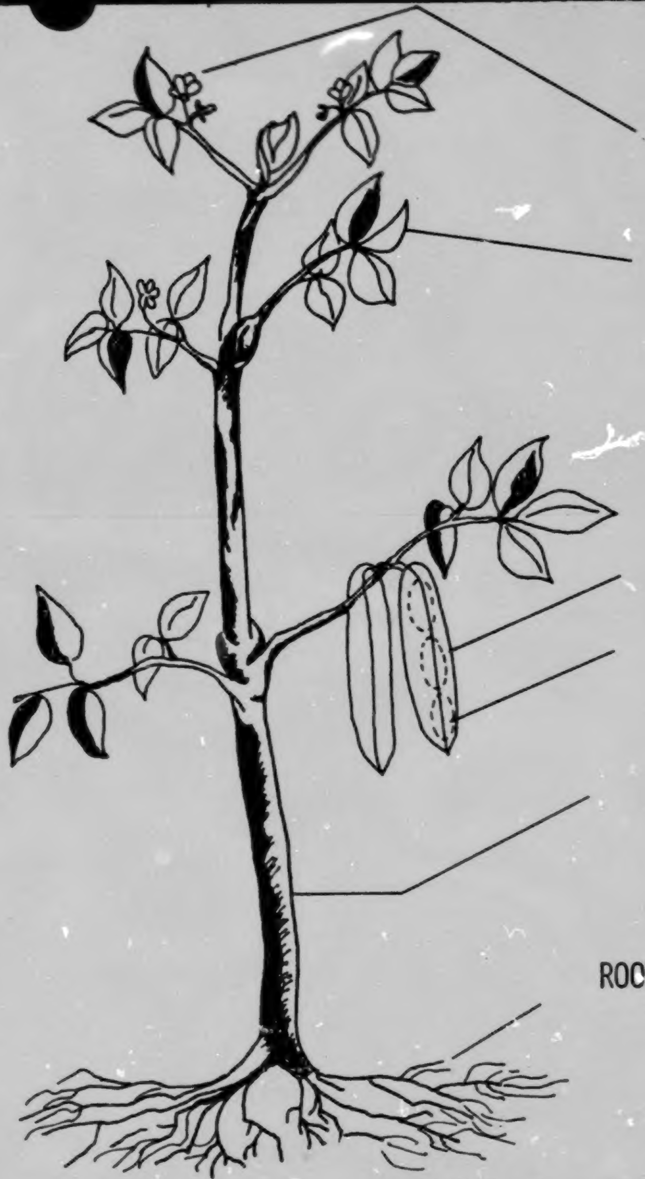
2. List the ten top money crops in Louisiana in order of economic importance.

3. Name the crops grown in local community.

4. Describe the importance of plants in mankind's search for food, shelter, clothing and clean environment.

5. Name the four basic parts of the plant and give the function of each.

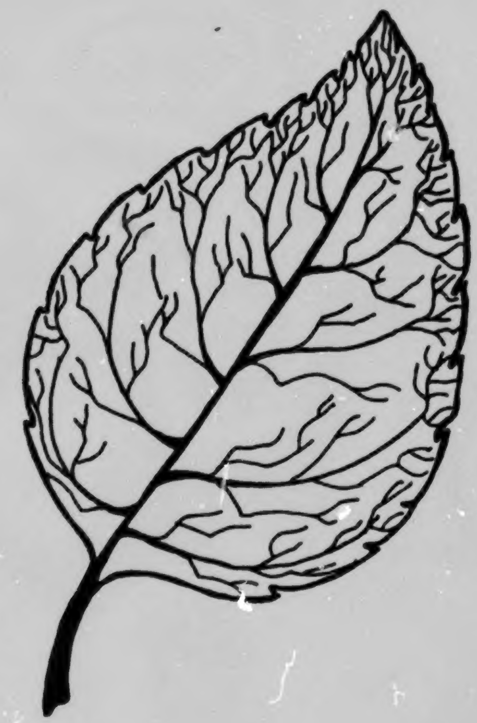
6. Illustrate and label the two types of root systems.



PLANT PARTS	FUNCTIONS
FLOWER	Attracts insects for pollination.
LEAVES	Essential for food manufacture.
FRUIT	The seed carrying structure.
SEED	Functions in reproduction.
STEM	Main body of plant; supports branches and transports food and water.
ROOTS	Anchors the plant; helps in absorption and food storage.

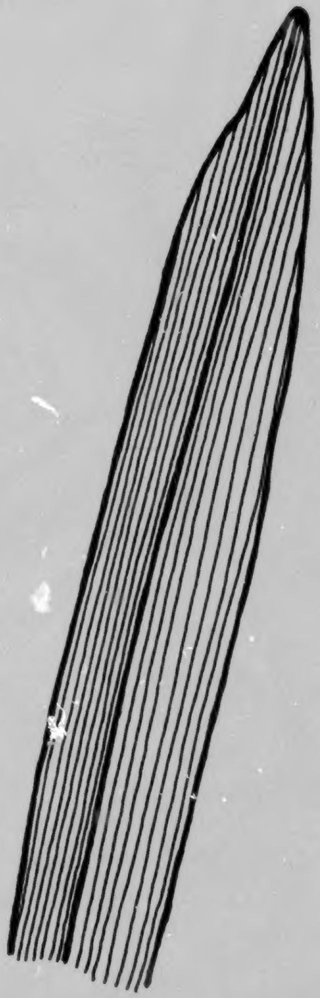
PARTS OF A PLANT AND THEIR FUNCTIONS

Transparency I-1-A



NET-VEINED

FOUND ON: TREES
SHRUBS
SOYBEAN PLANTS
WANDERING JEW

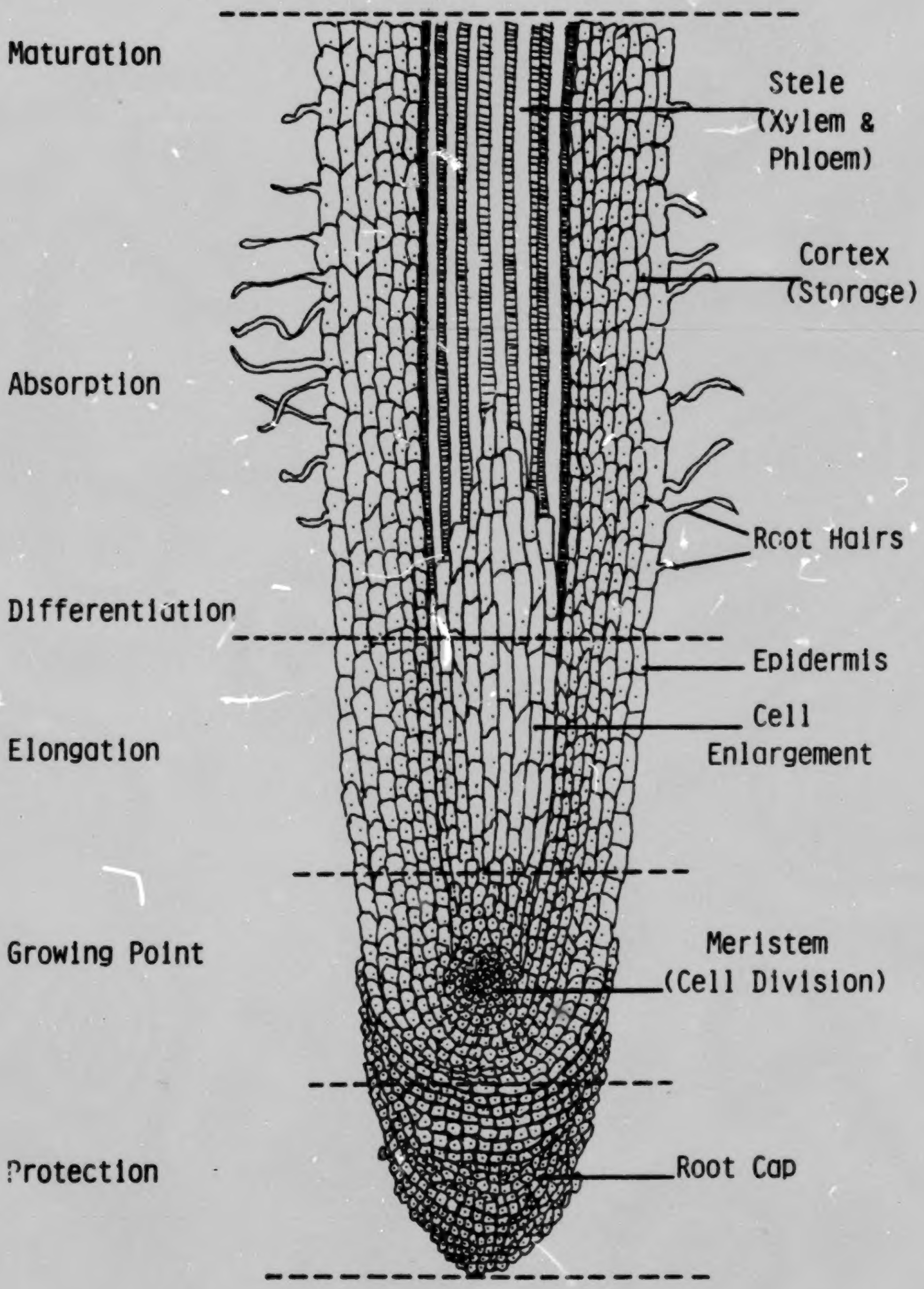


PARALLEL-VEINED

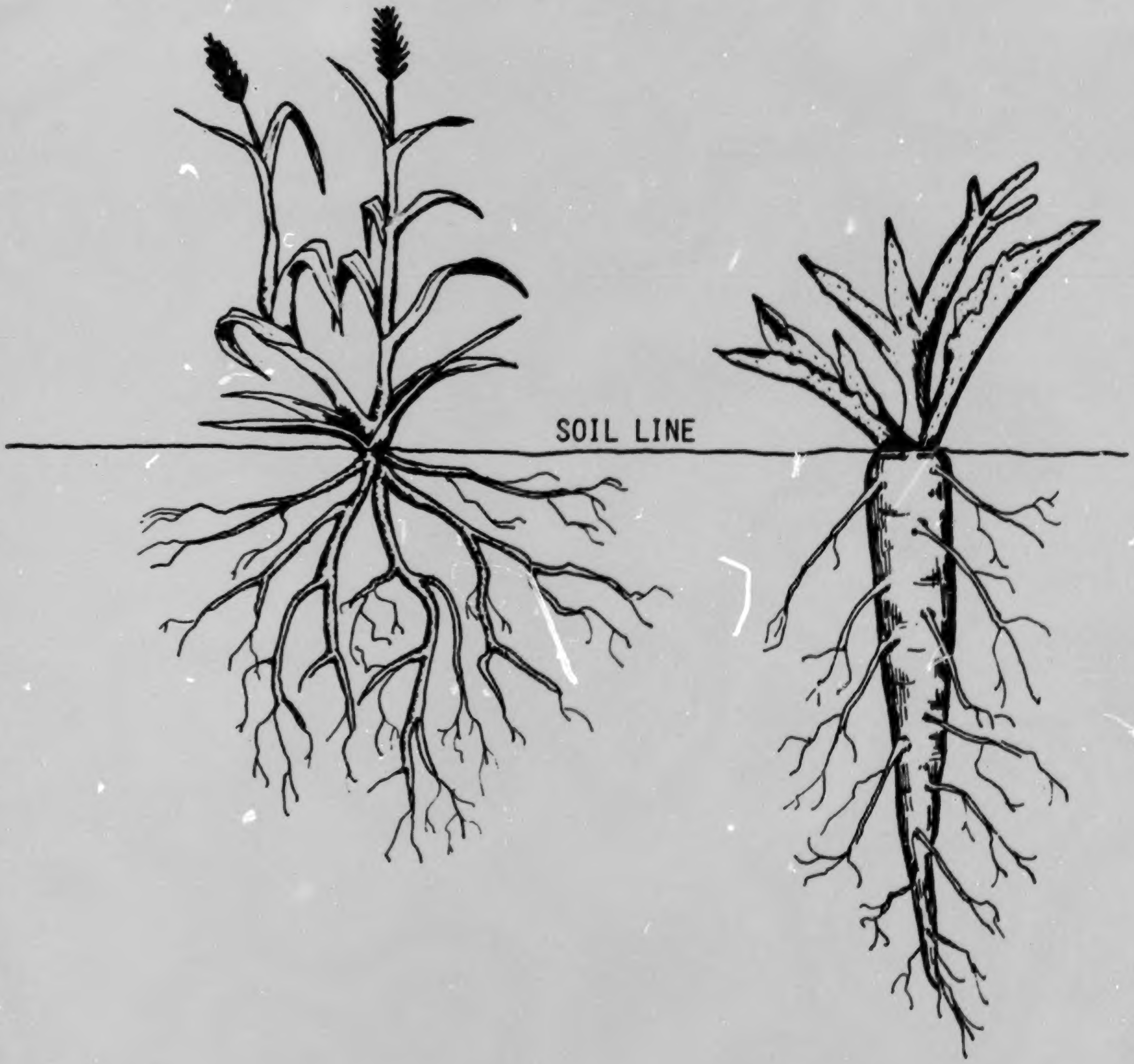
FOUND ON: GRASSES
CORN PLANTS
LILY
SPIDER PLANT

TYPES OF LEAF VENATION

TYPICAL ROOT TIP


Maturation
Stele
(Xylem &
Phloem)
Cortex
(Storage)
Absorption
Root Hairs
Differentiation
Epidermis
Cell
Enlargement
Elongation
Growing Point
Meristem
(Cell Division)
Protection
Root Cap

Transparency I-1-C



FIBROUS ROOT

Found on:
- grasses
- annual flowers
- annual weeds

TAP ROOT

Found on:
- most vegetables
- trees
- shrubs
- cotton

TYPES OF ROOT SYSTEMS

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT I: Growth Processes of Plants

LESSON 2: Plant Nutrition

I. Preparation for Instruction

A. Objectives

1. Terminal: List the primary plant nutrients and identify their functions.

2. Specific:

a. Define new Plant Science terms.
b. Identify the three primary elements and their functions in plant growth.
c. Identify different conditions of the plant when various amounts of fertilizer are lacking.
d.

e.

f.

B. Review Teaching Materials

1. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Inc., Albany, N.Y., 1979. Unit 3.

2. LSU Cooperative Extension Service Publications, #1388, "Enter the World of Plant Science," 1972.

3. Additional information available from Potash & Phosphate Institute, 2801 Buford Hwy., N.E., Atlanta, GA 30329.

4. Films available from Venard Films, Box 1332, Peoria, Illinois 61601 (available at no charge).

C. Special Arrangements

1. Materials

a. Fertilizer containers
b. Fertilizer samples
c. Large containers with drainage holes
d. Seeds or plants
e. Lighted area suitable for plant growth

2. Travel

Tour fertilizer distributor operation.

3. Audio visual equipment

Overhead projector/transparencies

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss importance of food to animals and plants.

2. Display fertilizer bag showing formulation of ingredients.

3. Display different types of fertilizers including organic and inorganic types.

4. Display plant specimens or pictures of one normal plant and one or more plants deficient in nutrients.

B. Content Outline

1. Terms

   a. Available nutrients -- nutrients in water-soluble form ready to be used by the plants

   b. Leaching -- washing out of nutrients from the soil

   c. Element -- a simple substance that cannot be broken down by ordinary means

   d. Organic fertilizers -- fertilizers of plant or animal origin

   e. Inorganic fertilizers -- consist of chemical substances

2. Plant Nutrients

   All plants need certain nutrients to grow just like people and animals. Without calcium our bones and teeth would become brittle; without nitrogen plants would turn yellow and die. Just as our bodies must digest food before it can be used, plant nutrients must be in a water soluble form before the plant can use them. This is called available nutrients. Available nutrients are absorbed by the roots and flow upward through the plant stem to the leaves to feed the plant. Available nutrients may come from organic or inorganic fertilizers.

3. Primary Nutrients

   Plant nutrients, usually provided by fertilizer, may be divided into two groups:

   a. Major nutrients; (macro-nutrients) those needed in large amounts by plants, and

   b. Micro-nutrients; those needed in small amounts by plants.

   The major nutrients are nitrogen, phosphorus, and potassium. They are abbreviated N, P, and K, respectively, and are always written in this order.

These major elements are the main ingredients in commercial fertilizers. The content of the fertilizer is displayed by these three numbers on the front of the bag. (Transparency I-2-A)

If the container has 5-10-5 on the label, the mixture is 5% N, 10% P, and 5% K. This totals 20% elements. The other 80% is filler that is used to make the plant food distribution easier.

4. How Major Elements are Used

   a. Nitrogen

      Of the three major elements, nitrogen has the most noticeable effect on plants. Nitrogen does many things for plants:

      1) It encourages aboveground growth;

      2) It gives dark green color to the leaves;

      3) It produces soft, tender growth for crops such as lettuce and spinach; and

      4) It regulates the use of the other elements.

      Too much nitrogen can be harmful. It may:

      1) Lower the plant's resistance to disease,

      2) Weaken the stem because of long, soft growth,

      3) Lower the quality of fruit and make them too soft to ship, and

      4) Delay maturity or increase winter damage.

      Too little nitrogen may cause the plant to be:

      1) Yellow or light green in color, and

      2) Stunted in root and top growth.

Nitrogen leaches out very easily from the soil and must be reapplied at intervals throughout the growing season.

b. Phosphorus

Phosphorus affects plants in several ways:

1) It encourages plant cell division;

2) Flowers and seeds do not form without it;

3) It hastens maturity;

4) It encourages root growth and strong root systems;

5) It makes potassium more available for plant's use;

6) It increases plant's resistance to disease; and

7) It improves the quality of grain, root, and fruit crops.

Too much phosphorus can cause container plants to dry out due to the soluble salts in the soils. A white deposit on the surface of the soil or around the inside of the container indicates that the plants needs to be leached by running water slowly through the container for 10 minutes or more.

Too little phosphorus results in:

1) Purple coloring on the undersurface of the leaves,

2) Reduced flower, fruit, and seed production,

3) Susceptibility to cold injury,

4) Susceptibility to plant diseases, and

5) Poor quality fruit and seeds.

c. Potassium

Potassium affects plants by:

1) Increasing the plant's resistance to disease,
2) Encouraging a strong, healthy root system,
3) Being essential for starch formation, especially in potatoes, beets, etc.,
4) Being necessary for development of chlorophyll (green coloring),
5) Being essential for tuber development (potatoes),
6) Encouraging efficient use of carbon dioxide, and
7) Modifying effects of N and P.

Too little potassium causes plants to appear dry and scorched on the edges with irregular yellow areas on the surface.

5. How Much Fertilizer Should We Use?

The only sure way of determining what nutrients are needed is by taking a soil sample. Your county agent is the person responsible for this service in your parish. He will send the soil sample from your land to the state soil testing lab and then explain the results when they arrive. A soil sample can tell you the amount of each nutrient in the soil and the amount needed by a particular crop.

C. Student Activities

1. Give students sample problems involving fertilizer formulations. Have them figure the actual amount of each element and the amount of filler used in the samples of fertilizers.
2. Have students bring plants from their homes with suspected deficiencies. Discuss

symptoms of deficiencies and their possible cure. Treat plants and observe the results.

3. After dividing students into groups, have them conduct the fertilizer experiment as outlined on the Operation Sheet. Have students record their findings and discuss the results.

4. Arrange to tour a fertilizer distributor operation or local fertilizer manufacturing plant with students to observe mixing and application methods.

D. Suggested Study Questions

1. Define the terms found in the lesson.

2. How are nutrients taken up by the plant?

3. Name the three primary plant nutrients and their functions.

4. What are N,P, and K?

5. Compare the symptoms of N-P-K deficiences in plants.

6. Which element leaches out quickest?

7. What are the results of too much nitrogen and phosphorus in a plant?

8. What is the most reliable way to determine the type and amount of fertilizer to use on a particular crop?

9.

10.

OPERATION SHEET

Operation Title: Fertilizer experiment

Purpose: To observe condition of plants when varying amounts of fertilizer are applied to plants.

Conditions or situations for operation: Ample space for containers in lighted location with ample water supply.

Equipment, tools, and materials: Four half-gallon containers with drainage holes and about two gallons of soil;
20 seeds - i.e. corn, beans, oats, wheat, etc.;
1 lb. 8-8-8 fertilizer or equivalent
water; and
record sheet

Procedure:
1. Fill each container with soil.
2. Label containers #1, 2, 3, and 4.
3. In container 1 add no fertilizer.
   In container 2 add 2 tp. fertilizer.
   In container 3 add 4 tp. fertilizer.
   In container 4 add 6 tp. fertilizer.
4. Mix well with soil.
5. Plant five seeds in each container about one inch below surface.
6. Place containers outside and water every three-four days.
7. Thin plants when two to three inches tall.
8. Record height and color of plants on record sheet.

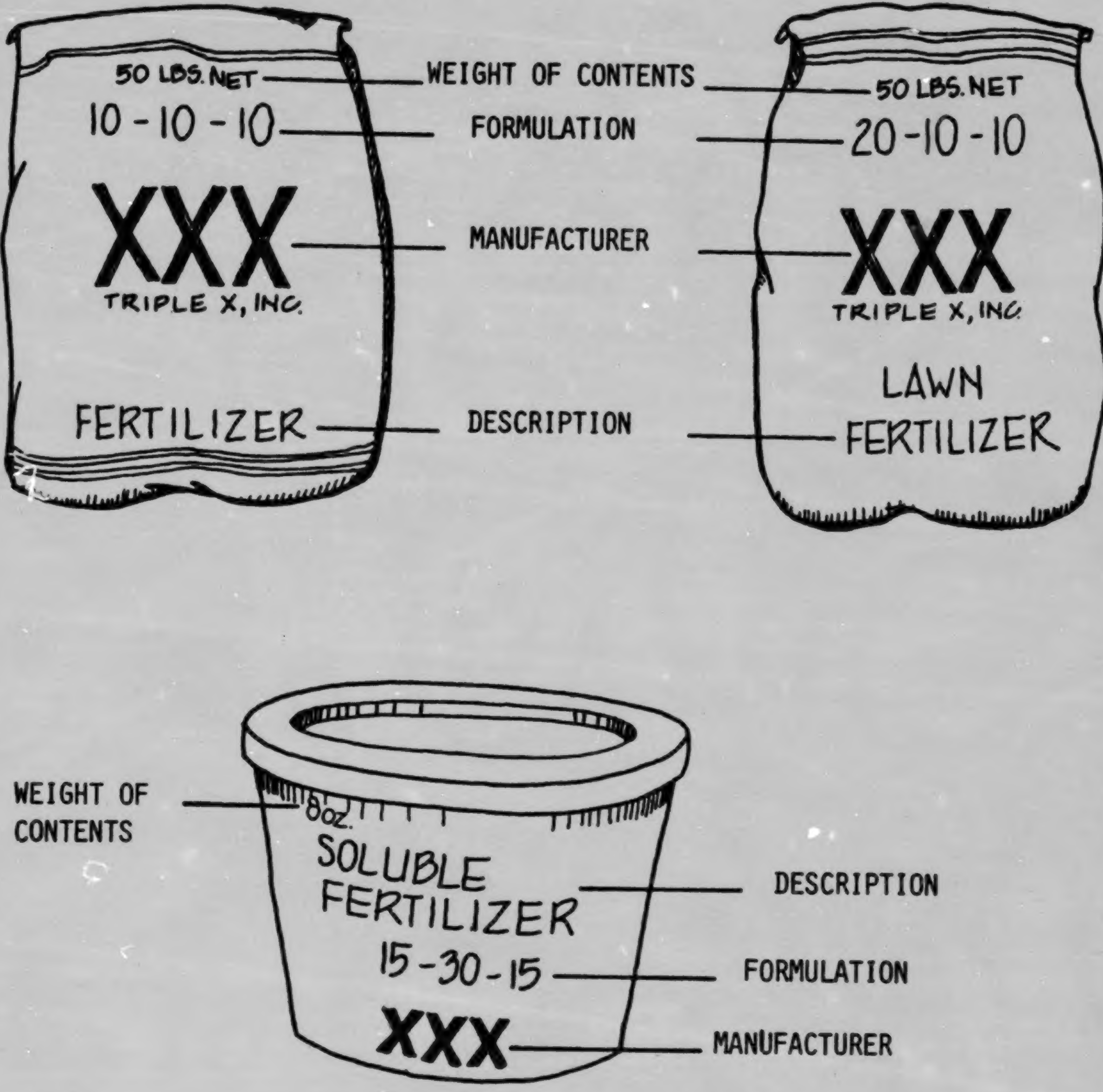
Precautions: water with sprinkler to avoid splashing soil out of containers.

Quality Criteria: none

Height of Plants in Inches and
Color of Plants*

Container	Weeks after Planting						
	2	3	4	5	6	7	8
1							
2							
3							
4							

* a - dark green   c - light green
b - green   d - pale green


50 LBS. NET
10 - 10 - 10
XXX
TRIPLE X, INC.
FERTILIZER
WEIGHT OF CONTENTS
FORMULATION
MANUFACTURER
DESCRIPTION
50 LBS. NET
20 - 10 - 10
XXX
TRIPLE X, INC.
LAWN FERTILIZER
WEIGHT OF CONTENTS
8 oz.
SOLUBLE FERTILIZER
15 - 30 - 15
XXX
DESCRIPTION
FORMULATION
MANUFACTURER

COMMERCIAL FERTILIZER CONTAINERS

Transparency I-2-A

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT I: Growth Processes of Plants

LESSON 3: Environmental Factors Affecting Plants

I. Preparation for Instruction

  A. Student Objectives

    1. Terminal: Explain the environmental factors that affect plant growth.

    2. Specific:

      a. Define new terms related to growth processes.
      b. Describe components of the plant's underground environment.
      c. Describe components of the plant's aboveground environment.
      d. List some warm and cool season crops.
      e. List optimum growth conditions for different types of plants.
      f.

      g.

      h.

  B. Review Teaching Materials

    1. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Inc., Albany, N.Y., 1979. Unit 3.

    2. LSU Cooperative Extension Service Publications, #1388 "Enter the World of Plant Science," 1972.

  C. Special Arrangements

    1. Materials

Plants damaged by environmental factors such as moisture, temperature, and light.

2. Audio-visual equipment

   Overhead projector/transparencies

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss students' ideas of what affects plant growth.
2. Display plants damaged by environmental factors.
3. Discuss with students why some plants are grown in winter and some in summer.

B. Content Outline

1. Terms

   a. Optimum -- best growing conditions for plants

   b. Organic matter -- dead or decaying plant or animal parts which improve the water-holding capacity of the soil

   c. Aerate -- to supply with air

   d. Green manure -- Green plants plowed under or mixed into the soil which add organic matter

   e. Retention -- holding back

   f. Media or medium -- material used to support plant growth

2. The Plant's Underground Environment

   There are certain factors that affect the growth and development of all plants. Those factors that affect the root system are:

   a. air,

   b. moisture, and

   c. minerals.

   Soil Structure and Texture

   Soil is made up of sand, silt, clay, organic matter, living organisms, and pore spaces which hold the water and air.

   Soil particles vary greatly in size. Sand has the largest particles while clay has the smallest. The clay in the soil helps to hold water and nutrients.

   Soils are formed from rocks weathering or being broken down by heat, water, and wind. It takes thousands of years for soil to form.

Soil is found in three layers:
(Transparency I-3-A)

1) topsoil,

2) subsoil, and

3) soil bedrock or lower subsoil.

Farmers are concerned with topsoil since this is the normal depth of plowing and plant growth. If the topsoil is sandy, the soil will be well drained but will not hold moisure or nutrients well. If the topsoil is clayey, it has about 30% clay and is considered heavy. These soils are poorly drained but will hold nutrients well. The soil must be aerated in order to support desirable growth and development. Loamy soils are the most desirable for general use. Loam means equal parts of sand, silt, and clay.

Soil can be improved by several methods:

1) Drainage -- drainage can be improved by increasing the aggregation or clinging together of soil particles. Adding organic matter, lime, and gypsum will improve soil structure. Raising planting beds and placing ditches between the beds will drain excess moisture from the soil.

2) Moisture retention -- adding organic matter to soils will improve the water holding capacity of soils as well as add plant food to the soil. Animal manure, green manure, peat moss, and sawdust (decayed) are good sources of organic matter. Mulches can be used to reduce runoff as well as control erosion.

3) Disease Prevention -- soils may contain certain diseases such as root rot and wilt. Nematodes and microscopic

animals in soils may also damage crops. Resistant varieties of crops and crop rotation will help to control these problems.

Soil used in container plantings should be sterilized. Composition can be mixed for individual plant types by adding sand, peat, or soil to the mixture. A recommended mixture is one part sand and one part peat, to three parts soil.

3. The Plant's Aboveground Environment

Factors affecting the aboveground environment include:

a. Temperature

Temperature has one of the strongest effects on plants. Certain crops may be adapted to cool temperatures and grow better in a 60-80 degree F range while others grow in a warmer 75-90 degree F range.

b. Light

Light provides the energy for the photosynthesis process. Without light, food would not be made by the plant. Each plant varies in the amount of light needed. Some houseplants can tolerate direct sunlight while others prefer almost complete shade. Selecting proper lighting for your plants will help to determine success or failure in growing plants indoors.

c. Moisture

Humidity is the moisture level in the air. Moisture in outside air is usually sufficient for outdoor plants. Indoor plants generally thrive from daily mistings from a spray mister because the air conditioning and heating of a home causes dryness.

d. Plant Diseases and Insects

Diseases and insects can cause considerable damage to crops as well as houseplants. In both cases, early detection may save both time and money. Always be aware of the condition of the plant and know the signs of trouble.

e. Gases in the Air

Plants "breathe" in carbon dioxide and "breathe" out oxygen just as we breathe in oxygen and breathe out carbon dioxide. A shortage of CO can cause plant damage. Gas heaters in a greenhouse must be carefully watched as the fumes may cause plant damage.

4. Optimum Conditions for Plant Growth

Each plant has its own special growth requirements to be met before maximum growth occurs. (Transparency I-3-B)

When the aboveground environment and underground environment are optimum, we have maximum plant growth.

C. Student Activities

1. After dividing students into groups, have them conduct the Temperature Experiment, the Moisture Experiment, and the Sunlight Experiment as explained on the operation sheets following this page. Have students record their findings and discuss them as a group.

2. Have students list crops as cool season or warm season according to the "Vegetable Planting Guide" planting dates. Also have them list the growing season and the days to maturity of their favorite crops.

3. Have students make a list of houseplants requiring full sunlight and another list of those requiring partial shade according to the lists in Introductory Horticulture, pages 272-278.

Operation Title: Temperature Experiment

Purpose: To observe plants when they are deprived of favorable temperatures.

Conditions or situations for operation: Must have cold weather outside or place where plants may be subjected to cold drafts.

Equipment, Tools, and Materials: Four 6-inch pots with drainage holes;
About two gallons of soil;
16 seeds (bean);
Water; and
Record sheet

Procedure:

1. Fill each container with soil.
2. Plant four seeds in each container.
3. Label each container with numbers 1, 2, 3, and 4.
4. Water all containers as needed until seeds germinate.
5. Keep all containers in a warm room in sunlight until plants are about three inches tall.
6. Thin plants to two per container.
7. Move pots 1 and 2 into a cool place with a cool draft.
8. Keep pots 3 and 4 in a warm place and continue to water all plants.
9. Record your results.

Height of Plants in Inches

Container	1st. week	2nd. week	3rd. week	4th. week
1				
2				
3				
4				

24 **OPERATION SHEET**

Operation Title: Sunlight Experiment

Purpose: To observe condition of plants when deprived of sunlight.

Conditions or situations for operation: Must have dark area available to place plants in during growing period.

Equipment, tools, and materials: Four 6-inch containers with drainage holes;
About two gallons of soil;
16 seeds (bean);
Water; and
Record sheet

Procedure:

1. Fill containers with soil.
2. Label containers number 1, 2, 3, and 4.
3. Plant four seeds in each container.
4. Water all plants until they emerge.
5. Thin to two healthy plants per container.
6. Place pots 1 and 2 in an area that receives sunlight.
7. Place 3 and 4 in a dark closet.
8. Water plants as needed.
9. Record your results:

Height of Plants in Inches

Container	1st. week	2nd. week	3rd. week	4th. week
1				
2				
3				
4				

OPERATION SHEET

Operation Title: Moisture Experiment

Purpose: To observe condition of plants when deprived of water for a period of time.

Conditions or situations for operation: Ample space for containers in sunlit location with ample water supply.

Equipment, Tools, and Materials: Four half-gallon
containers with drainage holes;
About two gallons of soil;
16 seeds;
Water; and
Record sheet

Procedure:
1. Fill each container with soil.
2. Label containers number 1, 2, 3, and 4.
3. Plant four seeds in each pot.
4. Cover seeds with ¼ inch of soil.
5. Water all pots as needed until the plants come up.
6. Thin to two plants per pot.
7. Stop watering pots 1 and 2, but continue to water 3 and 4 about every three days.
8. Put all pots where they receive sunlight and warm temperatures.
9. Record your results.

Precautions: Water with sprinkler to avoid splashing soil out of containers.

Quality Criteria: none

Height of the Plants in Inches

Container	1st. week	2nd. week	3rd. week	4th. week
1				
2				
3				
4				

D. Suggested Study Questions

1. Define the terms found in the lesson.

2. List the three factors that affect the root system.

3. What is meant by soil structure?

4. What is meant by soil texture?

5. How is soil formed?

6. Name the three distinct soil layers.

7. a. Explain the moisture and nutrient holding capacity of sandy and clay soils.
   b. Why are loamy soils more desirable for plant growth?

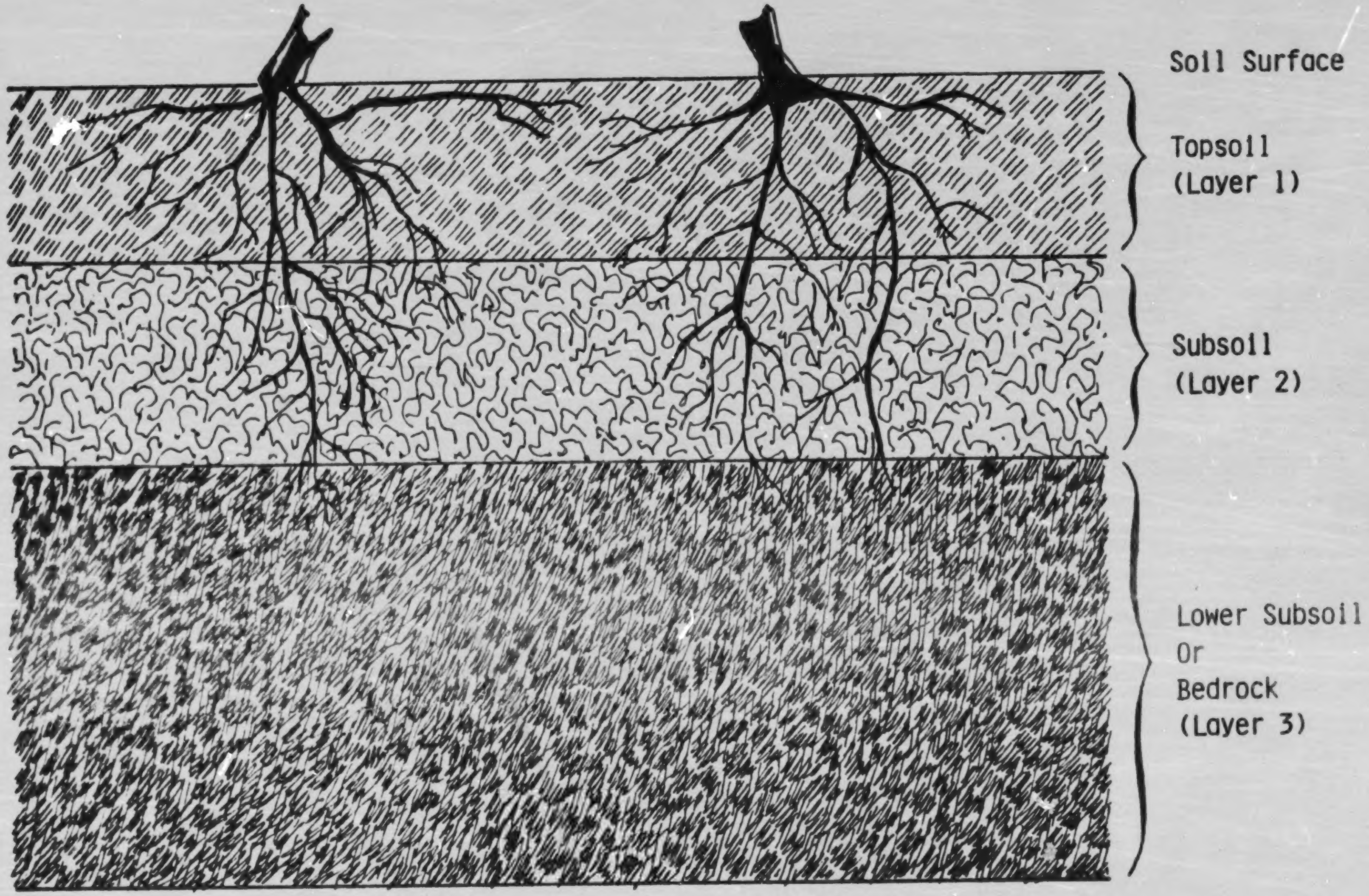
8. Describe a loamy soil.

9. Name and describe three methods of soil improvement.

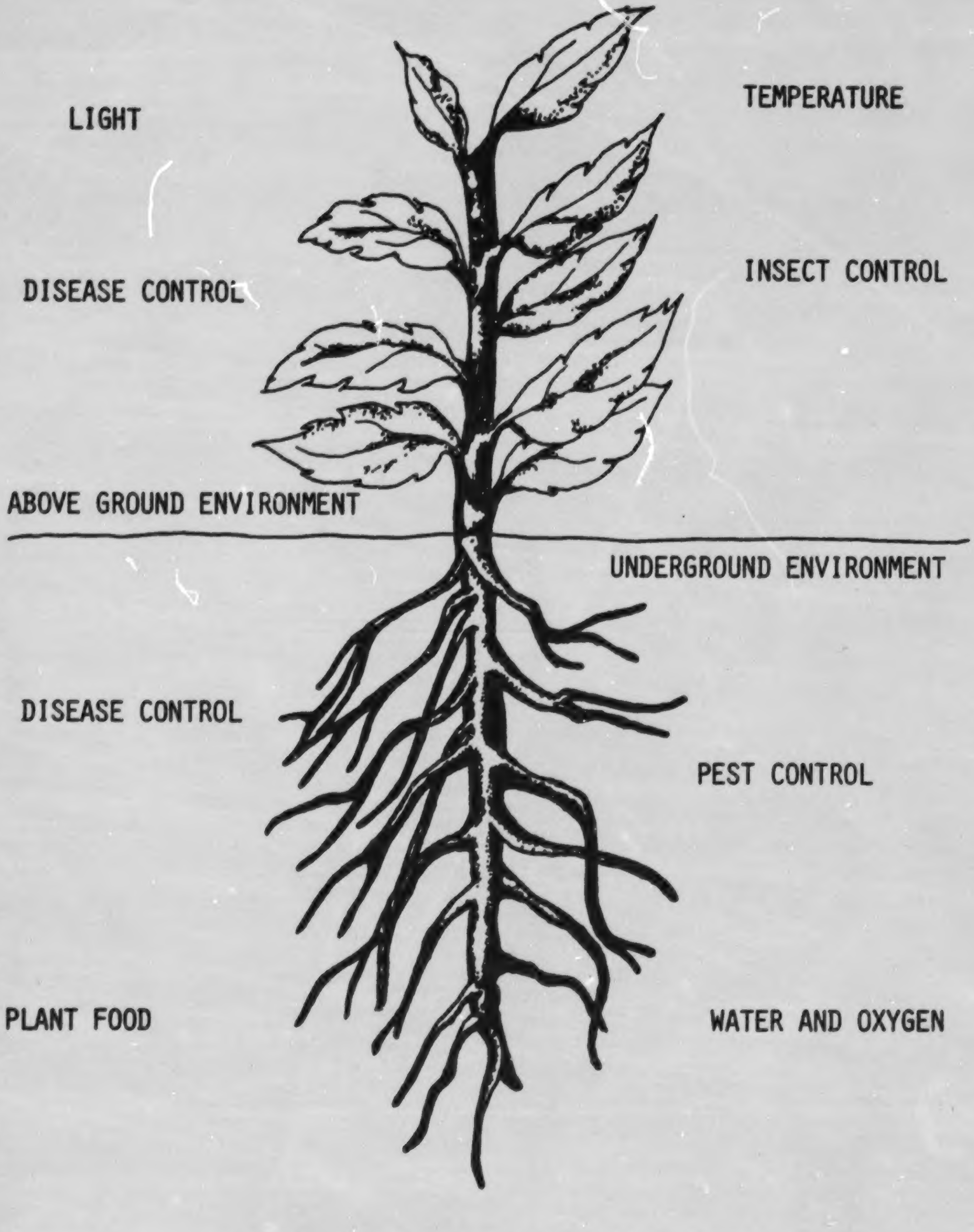
10. List the five factors affecting the above-ground environment of plants and explain each one.

11. Name some plants that grow best at 60°-80°F and some that grow best at 75°-90°F.

12.


Soil Surface
Topsoil
(Layer 1)
Subsoil
(Layer 2)
Lower Subsoil
Or
Bedrock
(Layer 3)

Transparency I-3-A


LIGHT
TEMPERATURE
DISEASE CONTROL
INSECT CONTROL
ABOVE GROUND ENVIRONMENT
UNDERGROUND ENVIRONMENT
DISEASE CONTROL
PEST CONTROL
PLANT FOOD
WATER AND OXYGEN

REQUIREMENTS FOR OPTIMUM PLANT GROWTH

COURTESY OF DELMAR PUBLISHERS

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT II: Cultural Practices for Plants

LESSON 1: Propagation

I. Preparation for Instruction

  A. Student Objectives

    1. Terminal: Demonstrate the methods of plant propagation.

    2. Specific:

      a. Define new terms related to propagation.
      b. Describe differences between sexual and asexual propagation.
      c. List examples of dicot plants and monocot plants.
      d. List characteristics of good seeds.
      e. Propagate plants by seeds, cuttings, separation, and division.
      f.

      g.

      h.

  B. Review Teaching Material

    1. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Inc., Albany, N.Y., 1979. Units 9-12 and 37-40.

    2. LSU Cooperative Extension Service Publications, #1388 "Enter the World of Plant Science," 1972, #1395 "Enjoy the World of Plant Science," 1979, #1636 "Grow a Garden," 1976, and #1980 "Louisiana Vegetable Planting Guide," 1980.

    3. Louisiana State Department of Education and LSU School of Vocational Education, "A

Basic Program in Plant Science," 1969. Pages 61-83.

C. Special Arrangements

1. Materials

   a. Seed inspection tags

   b. Samples of certified seeds

   c. Samples of poor quality seeds

   d. Garden plot

   e. Garden tools

   f. Seeds

   g. Paper towels

   h. Rooting box with clear plastic cover sheet

   i. Soil

   j. Plants

   k. Peat pots or flats

2. Travel

   Student projects in garden plot.

3. Audio-visual equipment

   Overhead projector/transparencies, slides and filmstrips.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss importance of planting quality seeds.

2. Display samples of certified seeds and seeds of poor quality.

3. Display samples of monocot and dicot plants. Label distinguishing characteristics.

4. Point out advantages of propagating plants as opposed to buying new plants in terms of cost, quality, quantity, etc.

5. Discuss advantages and disadvantages in growing vegetables for home use. Compare quality, cost, and availability of home grown vs. store-bought or processed vegetables.

6. Visit a local nursery to observe propagation techniques on a large scale.

B. Content Outline

1. Terms

a. Propagation -- the reproduction of new plants by sexual and asexual means

b. Germinate -- to sprout or begin to grow

c. Hard Seed -- seeds that fail to germinate due to a waterproof seed coat

d. Inert matter -- trash

e. Noxious -- undesirable seeds in a sample

f. Embryo -- young plant inside the seed

g. Dicot -- seed with two cotyledons

h. Monocot -- seed with one cotyledon

i. Hilum -- attachment of seed to the seed stalk

j. Epicotyl -- upper half of the embryo

k. Hypocotyl -- lower half of the embryo

l. Cotyledons -- seed leaves

m. Endosperm -- stored plant food

n. Dormant -- in a resting or non-growing state

o. Bulb -- vegetative structure which consist of layers of fleshy scales over-lapping each other (onion)

p. Corm -- swollen, underground stem which grows upright (gladiolus)

q. Tuber -- fleshy stem or root which reproduces by growing new plants from each eye or bud (potato)

r. Tuberous root -- thick root containing large amounts of stored food (dahlia and sweet potato)

s. Rhizome -- underground stem which produces roots on the lower surface and extends leaves and flowering shoots above the ground (Johnson grass and iris)

t. Stolon -- above ground horizontal stem which produces roots and leaves

2. Sexual Reproduction (Transparency II-1-D)

Sexual reproduction uses seeds to produce new plants. The seeds are formed by pollination of the female part of the plant. (Transparency II-1-E)

Seeds can be treated and stored for long periods of time. Seeds become plants by a process called germination. They need moisture, air, and proper temperature to germinate. After germination, the seeds contain enough stored food to support the plant until the roots take over.

The basic parts of a seed are the:

a. seed coat -- protects the embryonic plant,

b. endosperm -- stored food which feeds the plant until the roots develop, and

c. embryo -- new plant which has an epicotyl and hypocotoyl.

(Transparencies II-1-A&B label the different parts on a corn and a bean seed.)

3. Seed Selection

Most vegetable and grain crops are propagated by seeds. It is important to always buy good seed to insure a good crop.

Characteristics of good seeds are:

a. The seeds should be pure and not a mixture of varieties;

b. Seeds should germinate rapidly to give strong, vigorous seedlings;

c. The seeds should be large for the variety and plump;

d. There should be no insects, insect eggs, or disease spores in or on the seed;

e. The seeds should be uniform in size and shape; and

f. The seeds should be free of rocks, chaff, or other foreign matter.

There are laws established by federal and state authorities to protect consumers when buying seeds.

All seed containers must bear a label that has all of the following information: (Transparency II-1-C)

a. Common name

b. Kind and variety

c. Where grown, net weight, and lot number

d. Percent of pure seeds

e. Percent of inert matter (chaff, broken seeds, stems, soil)

f. Percent of crop seeds (variety not stated)

g. Percent of weed seeds

h. Percent germination

i. Percent hard seeds

j. Date tested

k. Name and number of noxious weed seeds per pound

l. Name and address of the grower

In addition, seeds are classified into Breeder seeds, Foundation seeds, Registered seeds, and Certified seeds.

Breeder seeds have a white tag. These are used by the breeder to maintain the true variety. They are never sold to the public.

Foundation seeds have a white tag. These are used by farmers to grow seeds to sell as registered seeds. They are carefully handled and supervised by an agronomist. Experiment Stations use foundation seeds.

Registered seeds have a purple tag. These are approved and certified by a certifying agency and are used to produce certified seeds.

Certified seeds have a blue tag and are the seeds most commonly sold to the public. They are approved and certified. These are used by farmers and gardeners when quality is important to the producer.

4. Plant groups

Plants are grouped into two large divisions called monocotyledons and dicotyledons.

A monocot has only one seed leaf after germination. Monocots have no distinct bark or wood layers and are parallel-veined. Corn, wheat, oats, and most grasses are monocots.

Dicots have two cotyledons after germination. The stem of the dicot emerges with the old seed still attached in a curved downward position. Trees, shrubs, and most vegetables are dicots.

(Transparencies II-1-A&B - Seed Types)

5. Types of Seeding

a. Indirect seeding

Indirect seeding is a process in which seeds are sown in a separate place from where the plants will eventually grow to maturity. The seedlings are transplanted after their first true leaves appear. The seeds may be planted in flats, trays with individual cells, peat pots or other shallow containers. Seeds should be planted with the calendar in mind. For example, if tomatoes can be planted outdoors after April 1 and it takes 4 to 6 weeks for seeds to germinate and develop true leaves, you would plant tomato seeds in late February or early March and transplant them outdoors in April. Plants commonly planted by indirect seeding are coleus, salvia, tomatoes, peppers, melons, eggplants, and cabbage.

The medium used in flats should be sterile, porous, uniform, and free of weed seeds, insects, and disease organisms. Several ingredients may be used:

1) Soil -- 45% mineral matter, 5% organic matter, 25% air, and 25% water. Most good topsoil is suitable.

2) Builder's sand -- large particle sand used for better aeration and drainage

3) Peat moss -- partially decomposed vegetation that has a high water-holding capacity

4) Perlite -- gray-white material of volcanic origin that improves aeration

5) Vermiculite -- light-weight mineral that expands when heated and has a high water-holding capacity

6) Jiffy Mix -- contains equal parts of shredded sphagnum moss, peat, and enough nutrients to sustain the plant through germination until transplanting

The ingredients used should be readily available and fairly inexpensive.

After seeding in the flats, each variety should be labeled -- name, variety, and date sown -- with a grease pen on a plant marker. It is very important to label plants correctly. Watering should be done carefully so not to bury seeds too deep or damage new seedlings. Sometimes a weak fertilizer solution can be used.

Before transplanting outdoors, the plants must be hardened-off by a process which makes them better able to withstand shock. The plants are gradually exposed to cooler temperatures and less water to prepare them for transplanting.

If seedlings are in flats, they must be transplanted to small pots until they are ready to be set outside. If seedlings are in Jiffy pots or peat pots, the middle step is eliminated.

b. Direct seeding

Direct seeding is planting seeds directly in a permanent location. Plants such as corn, beans, beets, peas, lettuce, carrots, and spinach are directly seeded.

Soil condition and preparation is very important when planting directly into the garden or field. The soil must be well prepared with no large clumps of earth or standing water in the area.

6. Asexual reproduction (Transparency II-1-F)

Asexual reproduction uses cuttings, separation, and division to produce new plants.

a. Cuttings

Cuttings are leaves or pieces of stems or roots and may be taken when the plant is soft (softwood) or hardened and more woody (hardwood). The cuttings may be taken from the leaf (African violets), bud (holly, azalea), stem (sugarcane, English ivy, pyracantha), or root (wisteria, spirea).

Cuttings require moisture, oxygen, warmth, and light to root. Rooting hormones may be used to speed root formation for those plants that are harder to root. This rooting hormone can be purchased at hardware stores or nurseries.

There are several steps that can be followed to take all types of softwood and semi-hardwood cuttings.

1) Decide on plants to be propagated. Prepare a label for each variety with the name and date of cutting.

2) Prepare rooting box. Fill with soil media and prepare a plastic cover to prevent moisture evaporation from box.

3) Select parent plants for cuttings. Use healthy plants that are full of moisture. Make cuttings from the current season's growth. Cuttings should be two to four inches long. Be careful not to confuse ends of cuttings and place upside down in the rooting box. Trim off all leaves except for two or three at top of cutting. A single leaf plus the petiole is a leaf cutting.

4) Insert into rooting media. Treat before inserting if using rooting hormone.

5) Water the media gently. Misting systems are ideal for use in rooting operations.

6) Insert label into the rooting container.

7) Control moisture evaporation by placing plastic over cuttings using a frame to hold it above the plants.

Refer to page 99 in Introductory Horticulture by Reiley and Shry to determine the best time to make cuttings of a particular plant.

Check the cuttings after two weeks for roots by tugging gently on the cutting. If it slips upward easily, roots have not developed. If it doesn't slip, dig up one cutting to check the size of the root ball. When cuttings have a two-to three-inch root ball they are ready to harden-off and transplant. To harden-off, reduce moisture and heat a little each day for two weeks. Never allow the plants to dry out. After the plants have hardened off, they are ready to transplant into containers and place under shade or sprinklers in a nursery setting.

Hardwood cuttings are treated in a different manner from the softwood cuttings. Hardwood cuttings are made during the winter. The cuttings may be stored for long periods of time and this makes it possible to ship them easily during the dormant period. Fruit trees, narrowleaf evergreens such as pine, juniper, and yew, dogwood, privet, grape and mulberry are some examples of plants propagated by hardwood cuttings.

The cuttings are made after the plant becomes dormant. This is when the plant has lost its leaves, except for evergreens, and is preparing for winter. The cuttings are made from the current season's growth that is mature and woody.

Hardwood cuttings should be six to eight inches long with several buds on them. If the plant is hollow-stemed, make the bottom cut just below a node and top cut about one inch above a node.

The cuttings may be stored in a moist, cool environment. The first four weeks of storage should be at 50° to 55° F and later lowered to below 40° F. As temperature variations will cause the wood to dry out faster, it should be kept at a constant temperature. Cuttings should be stored six to eight weeks before planting.

In the springtime, the cuttings are planted outdoors. They are planted in rows one foot apart with six inches between cuttings. One bud should be above ground. Mulching will help preserve moisture.

Organic matter such as dried manure, decomposed grass clippings, or compost may be worked into the soil to improve the texture and water-holding capacity.

b. Separation (Transparency II-1-G)

Both separation and division use plant parts that are specialized underground parts. The primary function of the parts is to store food but the parts may also be used in asexual reproduction. Separation is a method of propagation in which natural structures produced by certain plants are removed from the parent plant to produce new plants.

Bulbs such as tulips, amaryllis, and lilies are propagated by separating new bulbs from the mother plant.

Corms are very short, fleshy stems. They produce cormels which are separated and replanted to form new plants. Gladiolus corms are a common example.

c. Division (Transparency II-1-G)

Division is a method of propagation in which parts of the plant are cut into sections, each capable of developing a new plant. Rhizomes and tubers are examples of structures that are divided to produce new plants. The rhizome of the iris is dug up and divided with each section containing at least one bud (eye). The Irish potato is a tuber divided in the same manner.

Sweet potatoes are tuberous roots that are also propagated by division. Tuberous roots are dug in the fall and allowed to dry. In the spring, the clumps are divided so that each part has a shoot that is planted individually.

C. Student Activities

Have students germinate corn (monocot) and bean (dicot) seeds. Test the germination percentage and examine differences in the germination process -- (Refer to operation sheet).

D. Suggested Study Guide Questions

1. Define the terms found in the lesson.
2. Describe sexual reproduction in flowering plants.
3. List the factors necessary for seed germination.
4. List the basic parts of a seed.
5. What are the characteristics of a good seed?
6. What information is on a seed label?
7. Name the four classifications of seeds, tag color, and uses of each.
8. Distinguish between monocotyledons and dicotyledons.
9. Name and describe the two types of seeding.
10. Name and describe three methods of asexual reproduction in plants.
11. Produce mung bean sprouts or alfalfa sprouts-then eat them!

Operation Title: Germination of monocot and dicot seeds.

Purpose: To test germination percentage of seeds and to examine differences in germination processes of monocots and dicots.

Conditions or situations for operation: Warm location for germination and moisture supply.

Equipment, tools, and materials: Six paper towels per person or group;
At least 25 seeds of each type per student or group;
Moisture supply;
Plastic bags; and
Rubber bands

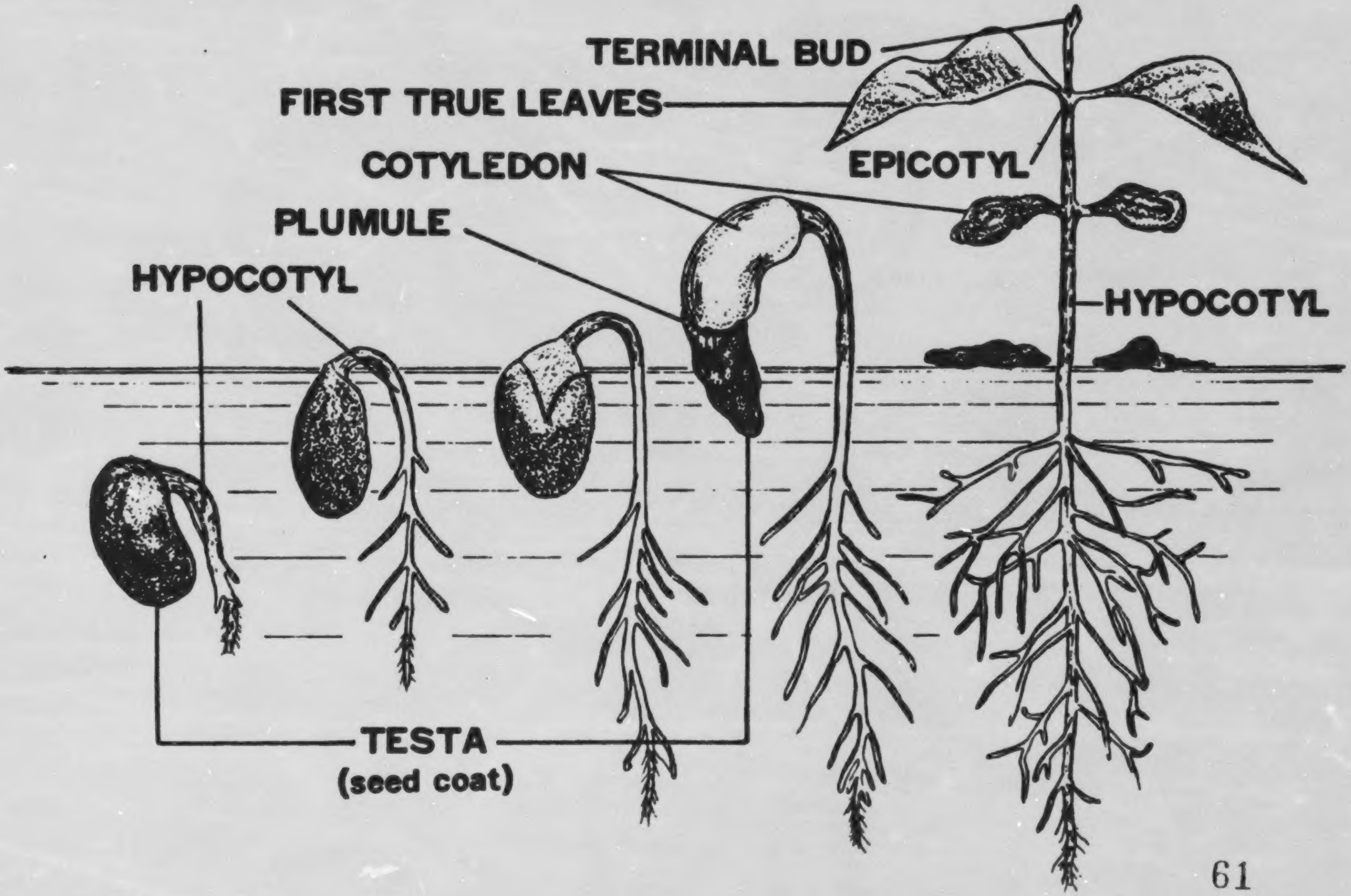
Procedure:

1. Moisten six paper towels and lay on table.
2. Place corn seeds in rows on one set of two towels. Place bean seeds in rows on the other set of two towels. There will be two towels left over to be placed on top of each set of seeds.
3. Beginning at one end, roll towel and seed firmly together and place rubber bands at the ends.
4. Label and place in plastic bags. Close bags but continue to add moisture every two days.
5. After two weeks, unroll towels and count the number of seeds germinated in each group. Use the following formula to determine the germination percent.

$$\frac{\#\ \text{germinated}}{\#\ \text{seeds in towel}} \quad \text{X} \quad 100 = \text{germination } \%$$

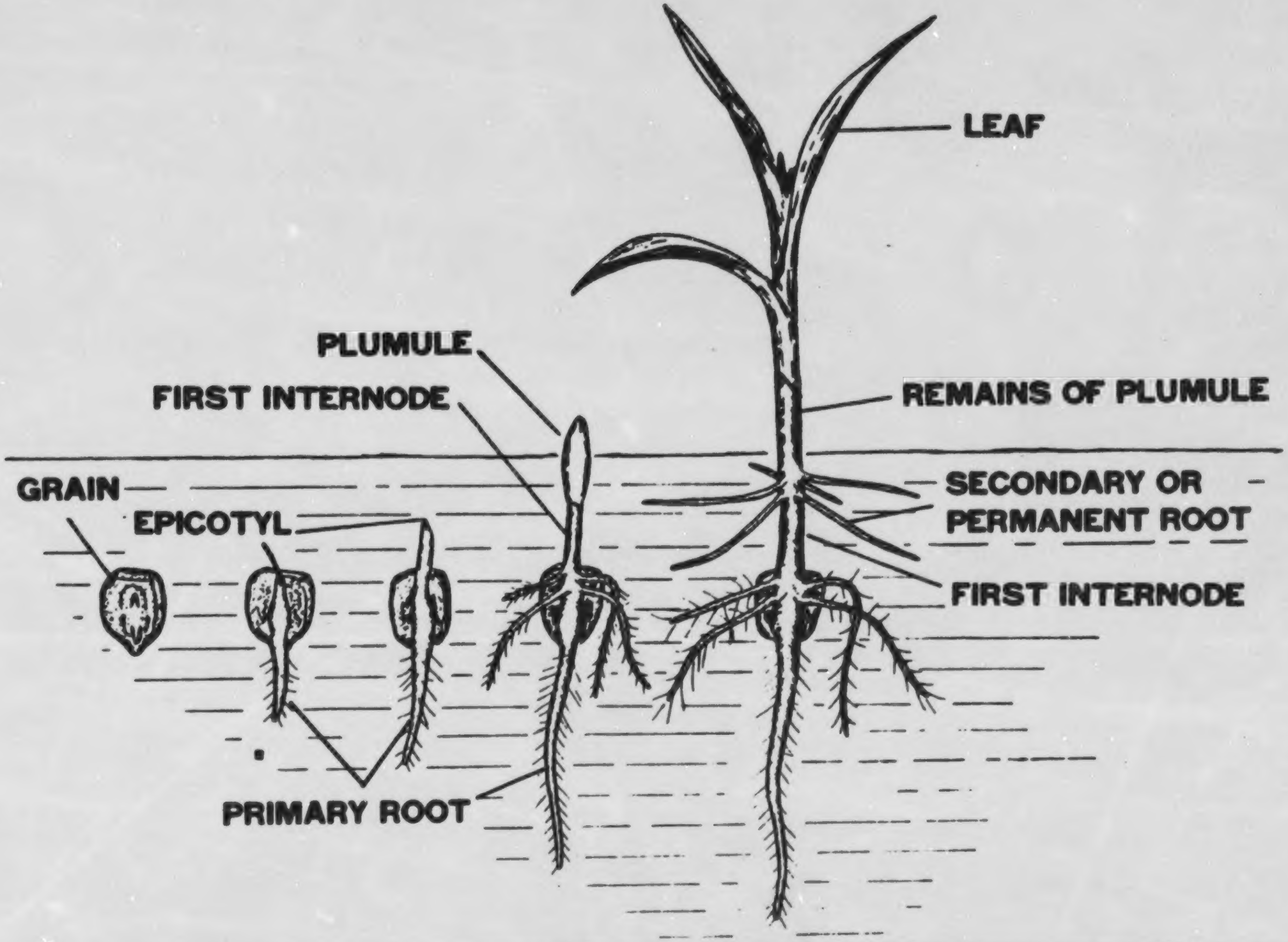
6. Examine seeds for differences in seed germination between monocots and dicots.

STEPS IN THE GERMINATION OF A BEAN SEED


TERMINAL BUD
FIRST TRUE LEAVES
COTYLEDON
EPICOTYL
PLUMULE
HYPOCOTYL
HYPOCOTYL
TESTA
(seed coat)

Transparency II-1-A

STEPS IN THE GERMINATION OF A CORN SEED


LEAF
PLUMULE
FIRST INTERNODE
REMAINS OF PLUMULE
GRAIN
EPICOTYL
SECONDARY OR PERMANENT ROOT
FIRST INTERNODE
PRIMARY ROOT

Transparency II-1-B

Sample Seed Label

CERTIFIED SEED

Known Pedigree
Field Inspected

CROP	SOYBEANS
VARIETY	BRAGG
LOT NO.	TR-8-7
NT. WT. LBS.	60

JOE SMITH SEED COMPANY
BENT FORK, MS

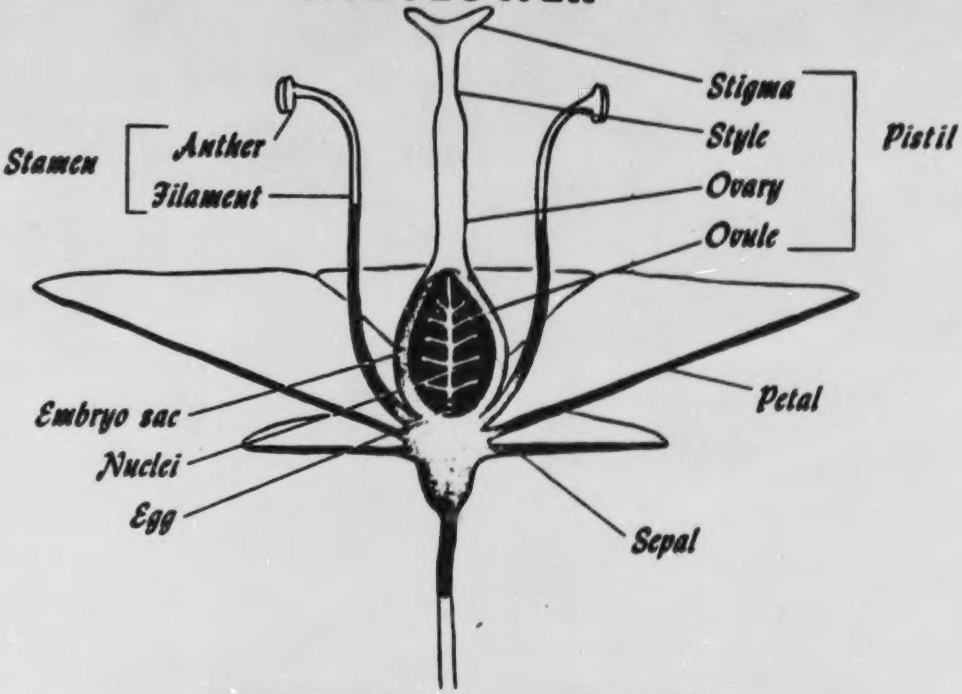
DATE TESTED	2 - 79
GERMINATION	84%
HARD SEED	0%
PURITY	98%
CROP SEED	0%
INERT	2%
WEED SEED	0%
NOXIOUS WEEDS	NONE

The container bearing this label when properly tagged under the regulations of the Mississippi Seed Improvement Association, contains the class of Mississippi Certified Seed as shown on this label

MEMBER OF ASSOCIATION OF OFFICIAL SEED CERTIFYING AGENCIES

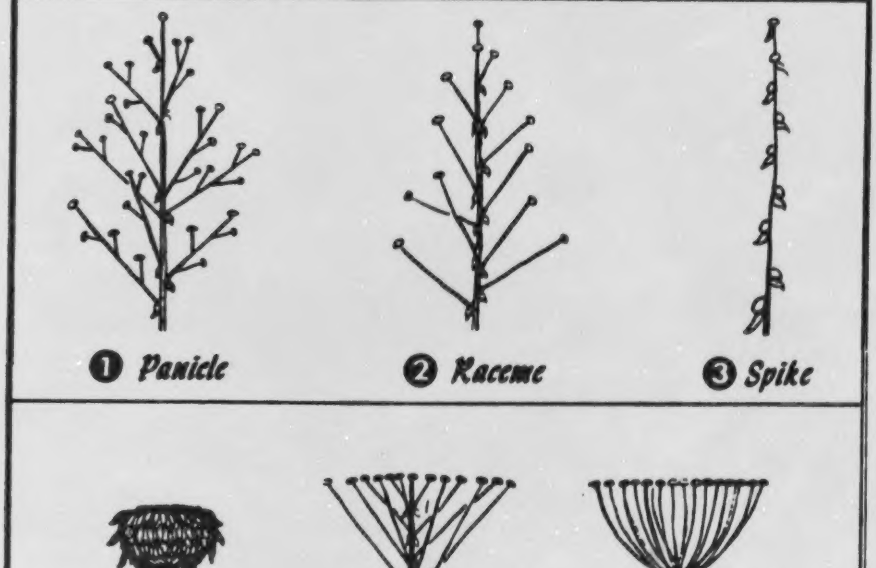
Transparency II-1-C

THE FLOWER


Stigma
Style
Ovary
Ovule
Pistil
Stamen
Anther
Filament
Petal
Embryo sac
Nuclei
Egg
Sepal

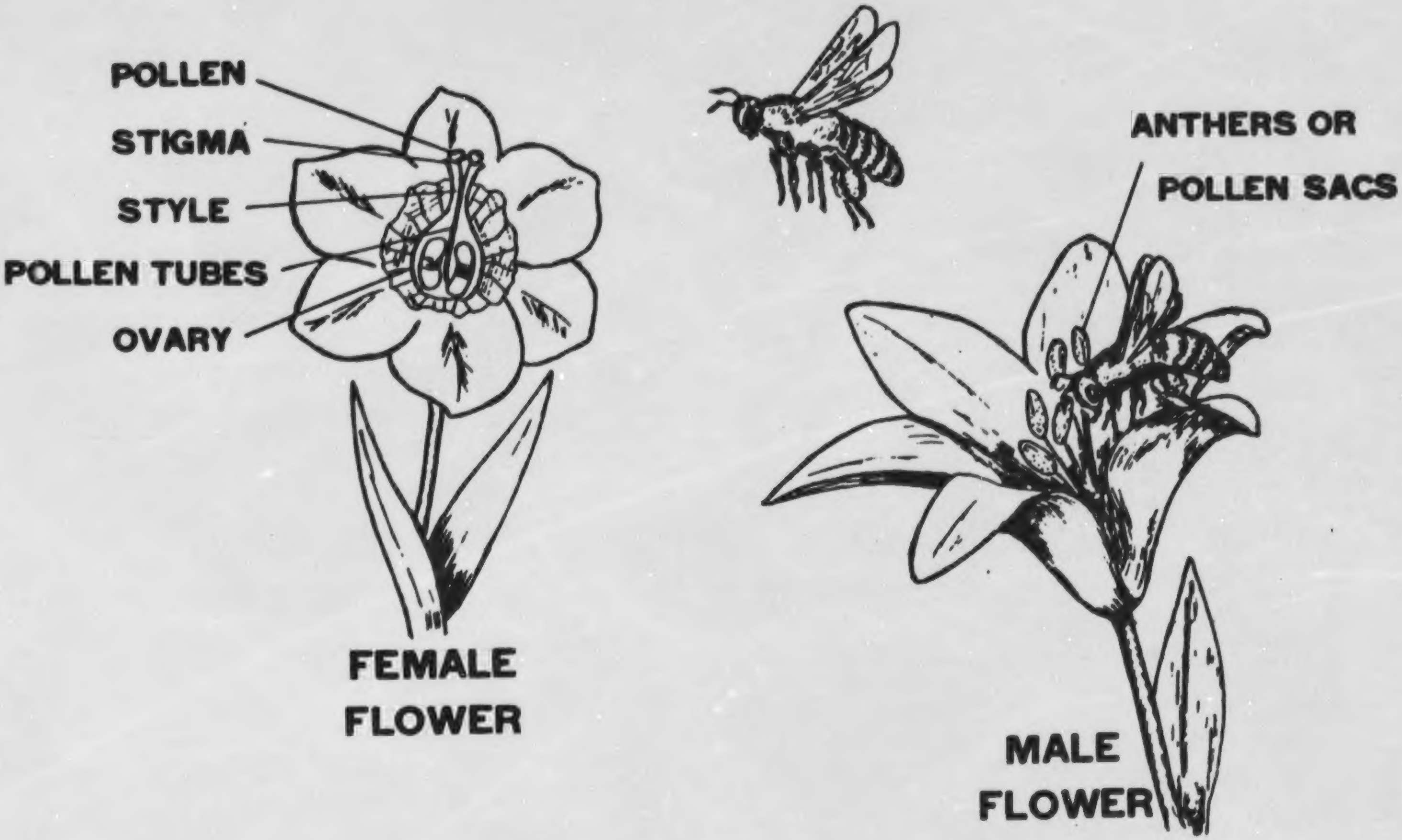
COMPLETE FLOWER

TYPES OF INFLORESCENCE


① Panicle
② Raceme
③ Spike
④ Head
⑤ Corymb
⑥ Umbel

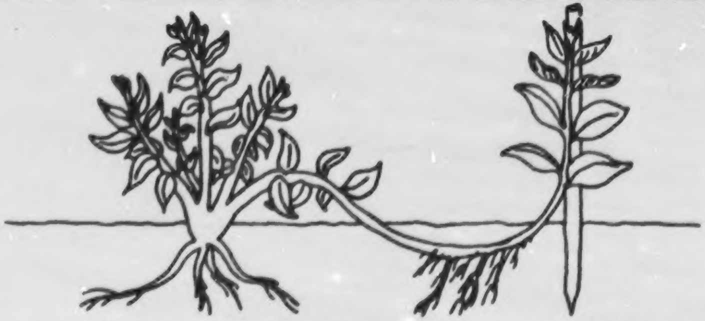
Transparency II-1-D

POLLINATION OF IMPERFECT FLOWER
DIOECIOUS PLANT

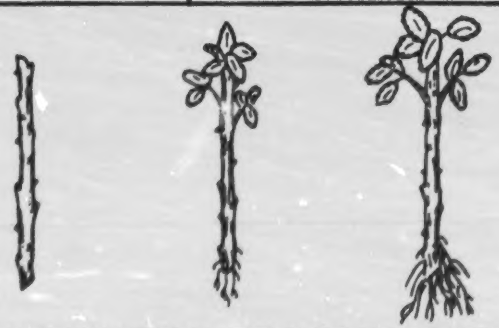

POLLEN
STIGMA
STYLE
POLLEN TUBES
OVARY
FEMALE FLOWER
ANTHERS OR POLLEN SACS
MALE FLOWER

Transparency II-1-E

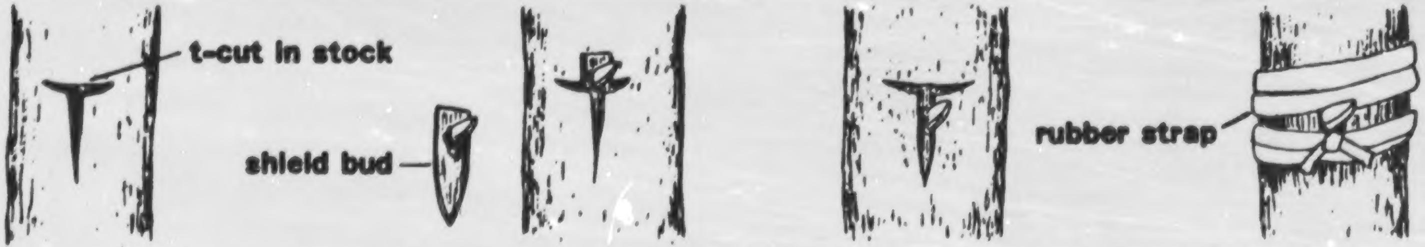
PLANT PROPAGATION



MANY SPECIES OF BERRY PLANTS ARE PROPAGATED BY LAYERAGE

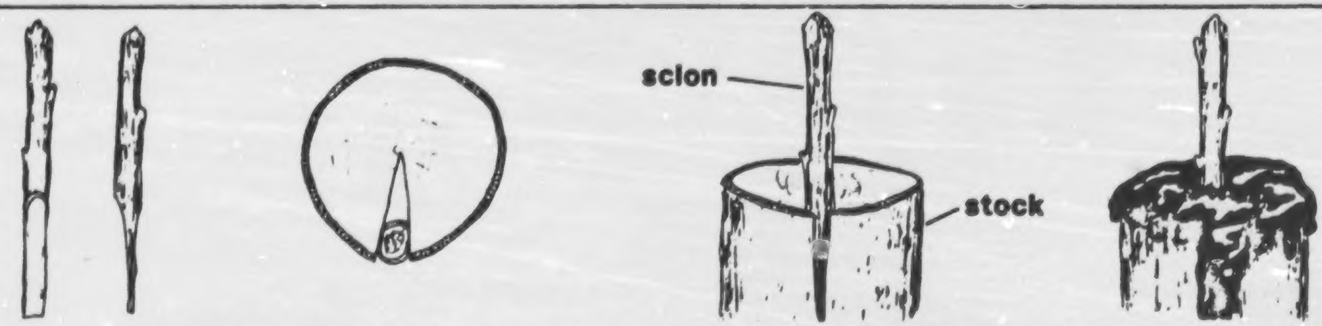


THE PROPAGATION OF ROSES IS MAINLY BY STEM CUTTINGS

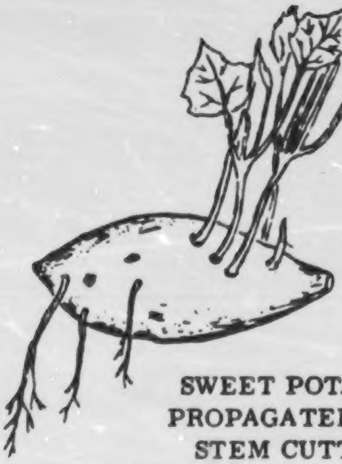

t-cut in stock
shield bud
rubber strap

BUDDING IS ONE OF THE MOST IMPORTANT METHODS OF ASEXUAL REPRODUCTION

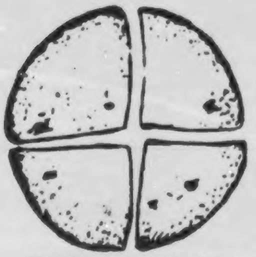
BUDDING IS IMPORTANT IN FRUIT AND NUT PRODUCTION


scion
stock

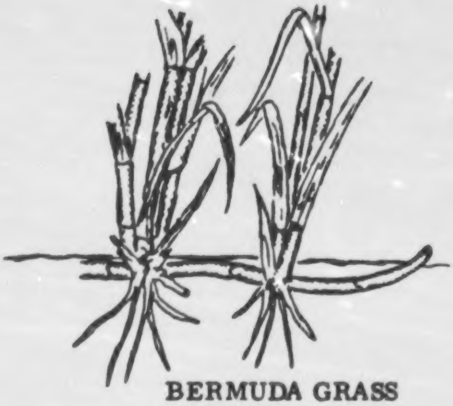
GRAFTING IS ALSO USED TO PROPAGATE FRUIT AND NUT TREES



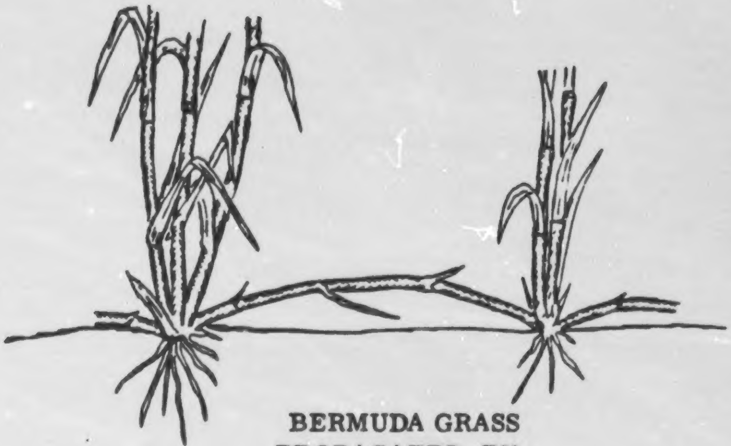
SWEET POTATO
PROPAGATED BY
STEM CUTTING



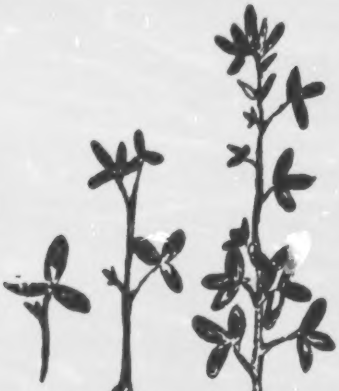
WHITE POTATO
PROPAGATED BY
MODIFIED
STEM CUTTINGS



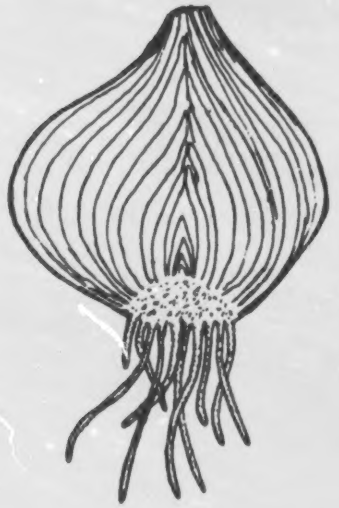
BERMUDA GRASS
PROPAGATED BY
RHIZOMES



BERMUDA GRASS
PROPAGATED BY
STOLONS



ALFALFA
PROPAGATED
BY
STEM CUTTINGS



ONION
MAY BE
PROPAGATED
FROM THE
BULB

Transparency II-1-G

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT II: Cultural Practices for Plants

LESSON 2: Weed Control

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Explain the importance of using measures to minimize weed growth.

2. Specific:

    a. Define new terms related to weed control.
    b. List ways weeds spread.
    c. List and discuss reasons weeds are harmful.
    d. List methods of weed control.
    e. Identify safety precautions to be used when applying herbicides.
    f. Apply herbicide to garden project.
    g.

    h.

    i.

B. Review Teaching Material

1. Delorit, R.J., L.J. Greub, and H.L. Ahlgren. Crop Production. Prentice-Hall Publishers, Englewood Cliffs, New Jersey, 1974. Chapter 22.

2. LSU Cooperative Extension Publication #1395 "Enjoy the World of Plant Science," 1979.

3. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Inc., Albany, N.Y., 1979. Unit 21.

4. Texas Vocational Service materials, IV-E-2, Basic Vo Ag II, "Weed Control-Chemical."

C. Special Arrangements

1. Materials

   a. Equipment used to apply herbicides

   b. Pictures of herbicide application equipment

   c. Herbicide product labels or product containers

   d. Mounting materials for weed specimens i.e. cardboard, plastic film, tape, labels, binders, markers, etc.

   e. Weed identification guide-recommended publication: "Weeds of the Southern United States." La. Cooperative Extension Publication #1516, 1975.

   f. Garden tools

2. Travel

   a. Student projects in garden plot

   b. Student trips to collect weed specimens

3. Audio-visual equipment

   Overhead projector/transparencies, filmstrips, and slides

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Display live weed specimens.

2. Discuss ways that weeds are harmful to crops, livestock, and humans in terms of competition, poison, and physical discomfort.

3. Visit local farms to observe weed control practices.

4. Display equipment used in weed control. Also, display herbicide product labels or containers.

5. Have a field representative from a chemical and herbicide company speak to group about chemical weed control and careers associated with this industry.

B. Content Outline

1. Terms

a. Weed -- any plant growing where it is not wanted

b. Annual --plant that grows from seed, completes its life cycle, and dies during the same year

c. Biennial -- plant which completes its life cycle in two years

d. Perennial -- plant which lives for more than two years

e. Vegetative propagation -- reproducing new plants by means of cuttings, graftings, rhizomes, stolons, or other methods

f. Selective herbicides -- chemicals that kill certain weeds

g. Non-selective herbicides -- chemicals that kill all plants

h. Calibrate -- adjust equipment to apply needed amounts of fertilizers, pesticides, etc.

i. Drift -- particles of a chemical blown to areas not intended to be treated by the chemical

j. Surfactant -- a material to add to herbicide to make it adhere to plants

2. Weed Classification

A weed is frequently defined as a plant that is growing where it is not wanted. Whether or not a plant should be called a weed depends largely on how objectionable it actually is. For example, Johnson grass in a pasture used for grazing would not be objectionable, but Johnson grass in a field of oats or soybeans would create serious problems.

Weeds may be divided into two broad categories:

a. Broad-leaved, which include the largest number of weeds such as purslane, ragweed, dock, cocklebur, etc.; and

b. Narrow-leaved, which include the grasses such as quack, Bermuda, Johnson, etc.

Weeds are also classified according to the length of time they live. There are three general classes: (Transparency II-2-A)

a. Annuals -- annual weeds grow from seed each year and complete their life cycles in one year. Summer annuals germinate in the spring, bloom, produce seed, and die in the fall. Winter annuals germinate in the fall and produce a rosette of leaves before frost. The plant continues to grow the next spring and sheds its seeds before fall. Some examples of annuals are barnyardgrass, chickweed, crabgrass, pigweed, and yellow foxtail.

b. Biennials -- biennials require two years to complete their life cycle. These plants germinate in spring, produce a well-developed root and a leafy rosette, stay dormant during the winter, then begin growth again the following spring, shed seeds, and die. Some examples of biennials are bull thistle, mullein, wild carrot, and poison hemlock.

c. Perennials -- perennials are plants that live for more than two years. They may propagate by seed or by vegetative structures. The aboveground part dies each year but grows back from the underground parts the following spring. Seeds mature and are scattered by various means to increase the weed population. Examples of perennial weeds are Canada thistle, dandelion, field bindweed, Johnson grass, ox-eye daisy, snapdragon, and wild onion.

3. How Weeds are Spread

Weeds are aided by man and animals along with special seed adaptations to help them spread rapidly over a large area. Although they have no means of actual locomotion, weeds are spread by:

a. Contaminants in crop seeds, feed concentrates, hay, and straw. Most weed seeds that contaminate a farmer's field are planted there unintentionally by the farmer himself. Using uncleaned seeds that have not been properly inspected will almost certainly introduce and spread weed seeds throughout the crop.

b. Wind
Some seeds have special adaptations which make them easily spread by the wind. Weeds such as milkweed, dandelion, Canada thistle, and bull thistle produce seeds with parachute-like attachments. These seeds may be blown long distances from the parent plant. The Russian thistle and tumbling mustard grow into a circular or ball-like form as they mature. When mature, they break off at the soil surface and roll with the wind scattering seeds as they go. These weeds are called tumbleweeds.

c. Water
All seeds are subject to being carried by water during periods of heavy rainfall or flooding. Some seeds may be adapted to float by a layer of corky material covering the seed.

d. Animals and Humans
Birds consume berries or seeds; some will be dropped accidently while others will be scattered through their droppings. Seeds with hooks, spines, claws, or beards will attach themselves to hair, wool, or clothing and be carried long distances. Farm machinery can also spread weeds by carrying the seeds to other areas.

Weeds can persist under very adverse conditions. Their high survival ability plus many special adaptations make eradication impossible and control a continuous process.

4. Harmful Effects of Weeds

Weeds are objectionable to man and animals for many reasons.

a. Reduction in yields

Weeds use moisture and nutrients that would otherwise be available for crop plants and therefore reduce crop yields. An example of this is the fact that one wild mustard weed will take as much nitrogen and phosphorus as two oat plants and as much water as four oat plants. A common ragweed uses as much moisture as three corn stalks.

Weeds can outgrow a crop plant and rob it of sunlight and moisture or wrap around the plant which may strangle it.

b. Reduced quality of plant and animal products

Weeds may reduce the quality of the crop and at times even render it unsalable. Weeds may lower the palatability of hay, infest crop seeds, may give dairy products an unfavorable taste. Weeds with hooks, burrs, or awns may be caught in sheep's wool which lowers its value.

c. Menace to livestock and people

Poisonous weeds usually occur in wooded areas or on the native prairies of the West. Cultivation usually eliminates this problem because poisoning is most likely to occur in over-grazed pastures where poisonous weeds grow. Poisonous weeds can cause nervousness, staggering, nausea, congenital deformities, abortion or possibly death.

Weeds affect human health by producing pollen which causes some to suffer from an allergic reaction called hay fever. A few weeds, such as poison ivy, nettles, poison sumac, and poison oak, are poisonous to the touch.

d. Losses from diseases and insects harbored by weeds

Some weeds cause greater losses to crop plants by perpetuating harmful insects and diseases than they do by direct competition for water, nutrients, and light. Weeds may serve as alternate hosts for certain plant diseases. For example, ergot is sometimes spread from wild rye or western wheat grass to cultivated rye, then to the common barberry plant which is the alternate host for the organism that causes black stem rust of wheat.

e. Losses from increased cost of labor
When weeds are prevalent, greater effort and expense are required for controlling or destroying them. Special equipment, as well as additional time and labor, may be needed.

f. Reduced land values
Weeds may reduce land value because of the effort needed by the new owners to destroy the infestation.

g. Losses from mechanically destructive weeds
Tire punctures are common in areas infested with spiny weeds. Much time and effort may be spent in repairs of damage caused by thorns.

There are some benefits that weeds may have including reducing soil erosion and leaching when the soil is bare by adding organic matter to the soil. They may also provide shelter for birds, wild game and other animals, hold snow, and provide bases for medicines.

5. Weed Control Principles

a. Prevention

The best way to avoid weed problems is to avoid planting them. In other words, plant crop seeds that are free of weed seeds. A farmer should always plant certified seed from a reputable dealer. Other methods of prevention are:

1) To prevent weeds present from producing seeds. If even a small patch of weeds are allowed to

spread seeds, the small patch will become a large problem.

2) To use livestock feed that is free of weeds. Straw, hay, whole grain, and scratch grain as well as purchased manure may all be sources of weed seeds. A farmer must be careful not to purchase any feed that contains weed seeds.

3) To clean combines and other harvesting equipment before moving from infested fields.

b. Mechanical Control

1) Cultivation
Cultivation is a common method of destroying young weeds. Seedbed preparation will destroy many young weeds. Cultivation repeated at weekly intervals will reduce the number of weeds that appear later in the crop. Hoeing is one method of cultivation that can be used before and after crop emergence.

2) Mowing
Mowing at the time of blossoming, before seeds mature, is a highly effective method of weed control for annuals and biennials. Mowing at regular intervals will help to control annual weed problems in one year and biennial weed problems within two years.

Perennials are harder to destroy because of their ability to reproduce vegetatively underground. The perennial weeds must be killed by either destroying the underground parts or cutting off the food supply by preventing leaf formation. Perennials may be eliminated through mowing by not allowing leaves to develop, which forces the plant to use up the root reserves and die.

3) Smothering
Eliminating the light to plants will stop their food-making pro-

cesses. Manure, straw, or tar paper may be used to shut out the light which smothers the plants. This method is profitable to use in small gardens, patches of strawberries, and in tree orchards.

Crops such as alfalfa, sweetclover, buckwheat, millet, and sorghum are used as smother crops. The crops grow more rapidly than the weeds and shade the sunlight from the weeds, robbing them of moisture and nutrients.

c. Biological Control

Biological control of weeds involves the use of insects or fungi which feed or live on certain species of weeds. To obtain biological control of a weed, several conditions are necessary:

1) The insect or parasite must be specific to the weed which is to be controlled; otherwise it will attack other crops.

2) The insect must be free of natural enemies which would interfere with its activities.

d. Chemical Weed Control

Control of weeds by chemicals began about 1945. There are many chemicals currently available for weed control. Many factors should be considered before using chemical weed control such as safety, growth habits of the weed, and effects of the chemical on humans, animals, and the environment. Proper methods and times of application also should be considered.

Chemicals used to kill specific weeds are called selective herbicides. Chemicals which kill all plants are called non-selective herbicides.

Chemical weed control is not a substitute for poor cultural practices but rather another weapon which can be used to the advantage of good farmers.

Herbicides may be applied in different ways: (Transparency II-2-B)

1) Broadcast -- application which covers the entire area of field at a uniform rate.

2) Row or band -- application of a band of chemical directly over the row. The area between the rows is cultivated.

3) Spot -- application applied to a small area. Usually applied to a weedy area within a field.

4) Directed spray -- involves directing a spray to a certain part of the plant.

Herbicides are applied at different times: (Transparency II-2-C)

1) Preplant -- made before crop is planted.

2) Pre-emergence -- made before the crop or the weeds, or both emerge from the soil. Application is frequently done during planting operation.

3) Post-emergence -- made after crop or weeds have emerged from the soil. The chemicals are applied to the leaves of the weed plant and may be:

    a) Contact-selective -- kills some plants by contact action but causes little or no injury to others.

    b) Contact-non-selective -- kills all plants by contact action.

    c) Systemic-selective -- kills certain plants by interfering with their living processes. The chemical is translocated through the living plant tissues.

Herbicides are applied in different forms:

1) Sprays
Most herbicides used in the United States are applied by spraying. Several advantages of sprays:

   a) It usually provides a more uniform application.

   b) Spray material is not as bulky and is less expensive than granular.

   c) Spray equipment can be used for other purposes if cleaned.

   d) Sprays can be directed to a given part of the plant or soil area.

   Several disadvantages of sprays:

   a) Water is required.

   b) Danger of drift.

   c) Application equipment is more expensive.

It is very important to apply the proper amount of chemical to a particular area when spraying herbicides. To avoid improper use, the sprayer must be calibrated before applying the herbicide. For example, if someone gave you one gallon of water and told you to water 20 houseplants using only that amount of water, you would need to figure how much water to give each plant in order to water each plant equally.

2) Granular
Granular herbicides are used primarily for pre-emergence treatments. The advantages include:

   a) No water is required.

b) Application equipment is cheaper.

c) Danger of drift is reduced.

Disadvantages may be:

a) The granular herbicides are bulkier and usually are more expensive than liquid herbicides.

b) Their application may not be as uniform as liquid herbicides.

Granular herbicide equipment must be calibrated.

6. Safety Precautions to Use with Chemical Application

If not properly used, weed control chemicals may be harmful to: the crop on which they are applied, nearby crops and animals, the environment, and even the operator himself.

For example, if your neighbor owns a vegetable garden, his plants could be killed if too much of the herbicide from your nearby field drifts to his garden.

Before a chemical is applied, the label should always be read and followed exactly. Special attention should be given to rate, time, and precautions recommended by the manufacturer. The sprayer should be calibrated before and cleaned thoroughly after use. Care should be taken to avoid drift.

Unused chemicals should be properly stored to insure their continued effectiveness and avoid unnecessary hazards. The following points should be observed:

a. Do not store chemicals near seeds and feed.

b. Do not store in the milkhouse.

c. Do not store where there is a fire hazard.

d. Do not store where children or animals can get to them.

e. Keep in original container.

C. Student Activities

1. Have students make a weed collection.

   a. Collect the whole plant, divide into parts and press between pages of a newspaper with a weight on top for about one week. Then mount it on stiff cardboard. Make sure to have part of the flower, leaf, stem and root.

   b. On the back of the cardboard record the following information:

      Identify the plant, giving common name and scientific name.

      What life cycle does it have (annual, biennial, or perennial)?

      Where was it collected and what date was it collected?

      How can this plant be controlled?

      LSU Cooperative Extension Publication #1516 "Weeds of the Southern U.S.," 1975, is useful for identification purposes.

2. Have students apply weed control practices to garden plot project. Have them identify weed problems and determine best method of control. Most weeds may be eliminated by mechanical control (with a hoe), but if herbicides are needed, have students observe mixing and application.

D. Suggested Study Questions

1. Define the terms found in the lesson.

2. What is a weed?

3. Name and give examples of the two broad categories of weeds.

4. Classify weeds according to their life span and give examples of each.

5. List the various ways weeds are spread.
6. How are weeds harmful?
7. How are weeds beneficial?
8. List preventive steps in weed control.
9. State three methods of mechanical weed control.
10. What two conditions are necessary to obtain biological control of a weed?
11. What factors should be considered before using chemicals in weed control?
12. Distinguish between selective and non-selective herbicides.
13. Describe the different methods of applying herbicides.
14. Distinguish between pre-plant, pre-emergence, and post-emergence herbicides.
15. What herbicide is used after weeds have emerged from the soil?
16. Name the advantages and disadvantages of spraying herbicides.
17. What are the advantages and disadvantages of using granular herbicides?
18. List safety precautions when using chemical herbicides.

KINDS OF WEEDS

ANNUALS

ANNUAL BLUEGRASS
COMMON RAGWEED
LAMBSQUARTER
PEPPERGRASS
CRABGRASS
DODDER
FALL RYE
WILD BARLEY
SHEPHERSPURSE
MORNING GLORY
COMMON CHICKWEED

BARNYARD GRASS
WILD MUSTARD
WILD OATS
FANWEED
PIGWEED
CHESS
FOXTAIL
SANDBURS
COCKLEBURS
CORN COCKLE
PURPLE NIGHTSHADE

BIENNIALS

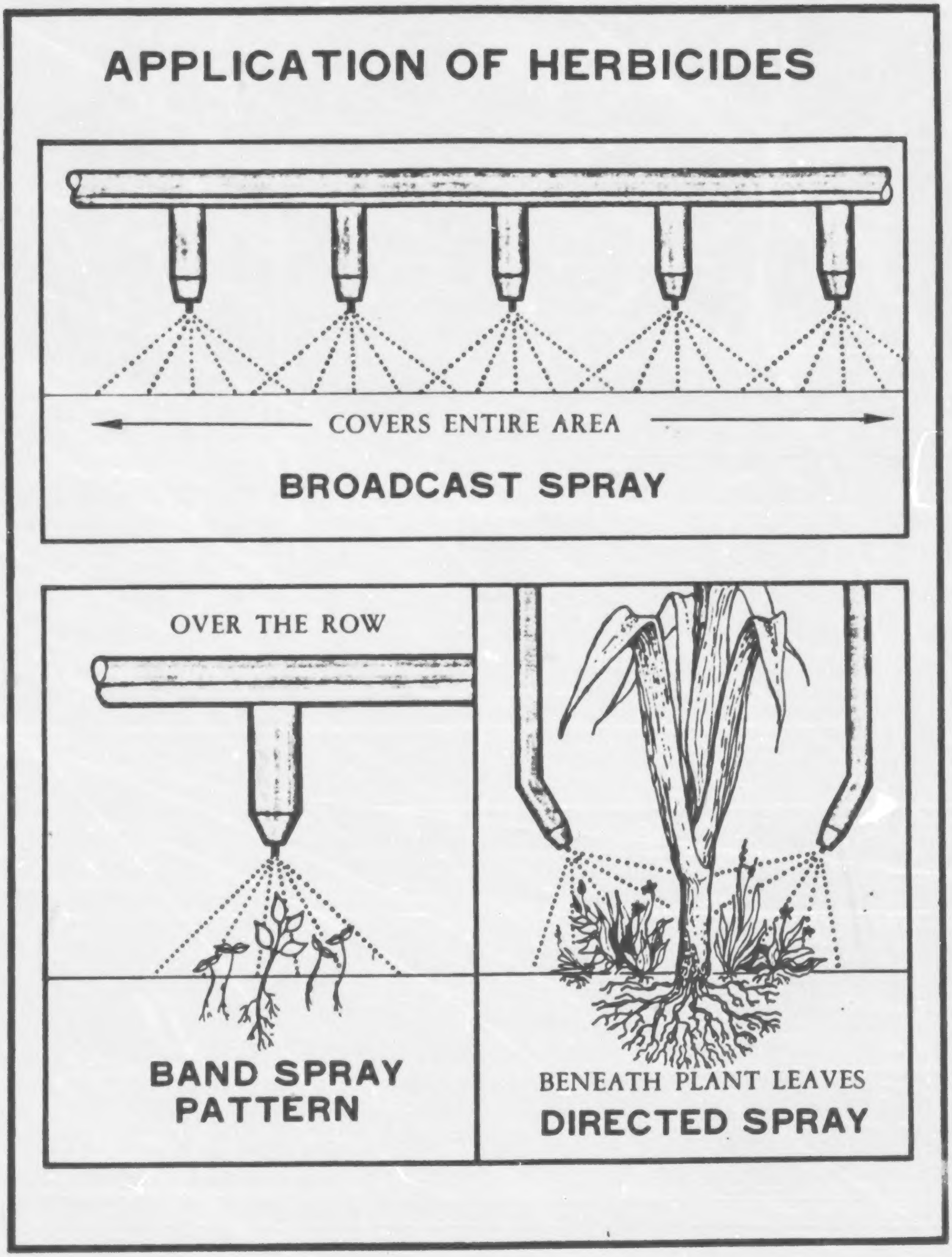
BURDOCK
POISON HEMLOCK

WILD CARROT
BULL THISTLE

PERENNIALS

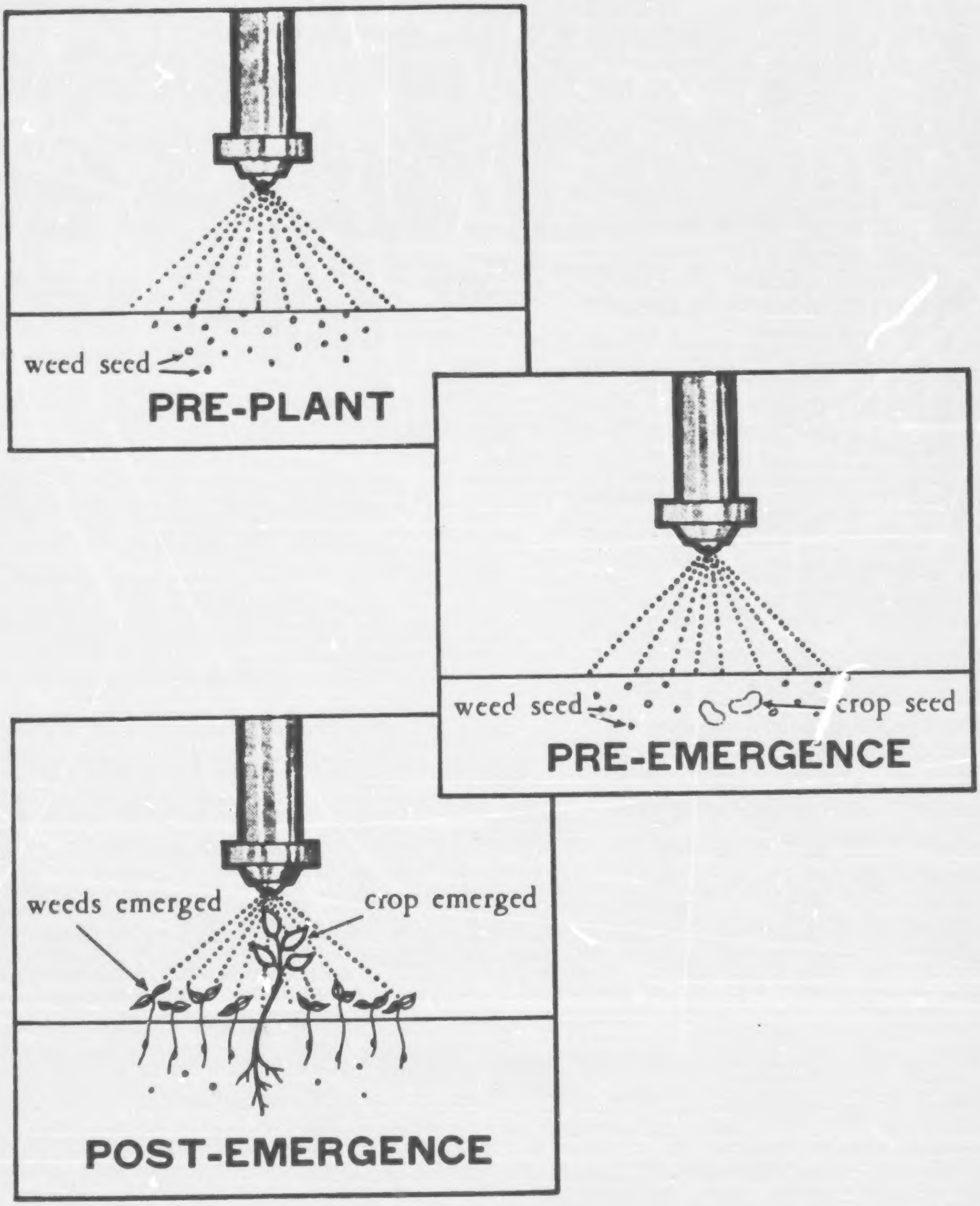
DANDELION
QUACK GRASS
SHEEP SORREL
BROAD-LEAVED PLANTAIN
SNAPDRAGON
CURLED DOCK
WILD ONION

NUTGRASS
JOHNSON GRASS
BERMUDA GRASS
BUCKHORN PLANTAIN
LEAFY SPURGE
CANADA THISTLE
FIELD BINWEED


APPLICATION OF HERBICIDES
COVERS ENTIRE AREA
BROADCAST SPRAY
OVER THE ROW
BAND SPRAY PATTERN
BENEATH PLANT LEAVES
DIRECTED SPRAY

Transparency II-2-B

APPLICATION OF HERBICIDES


weed seed
PRE-PLANT
weed seed
crop seed
PRE-EMERGENCE
weeds emerged
crop emerged
POST-EMERGENCE

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT II: Cultural Practices for Plants

LESSON 3: Moisture Control

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify methods of moisture control in plant production.

2. Specific:

a. Define new terms related to moisture control.
b. List three methods of moisture control.
c. List and explain the cultural practices used in moisture control.
d. Describe importance of drainage to crops.
e. Describe importance of irrigation to crops.
f. Describe the three methods of irrigation.
g. Apply moisture control to garden project.
h.

i.

j.

B. Review Teaching Material

1. Louisiana State Department of Education and LSU School of Vocational Education, "A Basic Program in Plant Science," 1969. pages 98-108.

2. LSU Cooperative Extension Publications #1388 "Enter the World of Plant Science," 1972, and #1395 - "Enjoy the World of Plant Science," 1979.

C. Special Arrangements

1. Materials

a. Pictures of irrigation equipment

b. Plants damaged by too little moisture

c. Plants damaged by too much moisture

d. Lamp chimneys or plastic cylinders

e. Quart jars

f. Plastic bags

g. Squares of cloth

h. Oblong waterproof boxes

i. Two pieces of 1-inch thick wood

j. Water sprinkling cans

k. Wide-mouth jars

l. Gallon cans

m. Garden soil

n. Seeds

2. Travel

a. Student projects in garden plots

b. Tour farms with improved moisture control operations

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss importance of water to crops. (Refer to Moisture Experiment in Student Activities). Display a plant harmed by too much water and one with too little, and a third plant that is healthy.

2. Display pictures of irrigation equipment in operation.

3. List and discuss drainage problems 58 that may occur at student's home, farm, and community.
4. Visit a farming operation that uses improved drainage or irrigation techniques.
5. Invite a Soil Conservation Service representative to speak to the class on soil conservation and careers associated with it.

59 B. Content Outline

1. Terms

   a. Irrigation -- the application of water to the surface or underground

   b. Mulch -- a protective covering spread or left upon the ground to reduce evaporation, prevent erosion, control weeds, or enrich soil

   c. Organic matter -- dead or decaying plant or animal parts which improve the water-holding capacity of the soil

   d. Run-off -- the flow of water from an area

   e. Seepage -- the escape of water through soil

   f. Subsoiling -- breaking of compact subsoils without inverting the soil

   g. Tillage -- working of the soil

2. Methods of Moisture Control

   Moisture control can be achieved through three basic methods. They are cultural practices, drainage and irrigation.

   a. Cultural Practices

      Good tillage and organic matter improve the soil in several ways:

      1) Improve soil structure,

      2) Improve aeration (oxygen around roots), and

      3) Increase water-holding capacity of soil.

      Organic matter may be described as partially decomposed plant and animal material in the soil that is in the process of further decomposition.

      Organic matter may be added to the soil in the form of:

1) Green manure crops (legumes and grasses)
2) Dried manure
3) Peat moss
4) Mulches
5) Compost includes grass clippings, peelings, and household garbage

All forms of organic matter must be worked into the soil several weeks before planting in order to allow sufficient time for decomposition to take place. Planting too soon after adding organic matter will cause young crop plants to "burn."

Terraces, contours, and vegetative covers decrease the run-off rate and therefore increase the amount of water that can be absorbed by the soil.

Subsoiling is a practice which increases the depth of soils that have hardpans near the surface. By increasing the soil depth, more water can be stored in the soil. This also allows for deeper plant root penetration.

Mulches may be used to decrease water run-off and prevent weed competition. They may be natural or artificial. A natural mulch is formed when the first inch or two of surface soil becomes dry. Straw or plastic sheets may be used as artificial mulches. Artificial mulches are especially good for use in crops such as strawberries and lettuce where hand labor is required.

b. Drainage

Plants require that the soil around their roots have air mixed with it. When soil does not drain properly, excess water builds up which stops root growth and soil microorganism activity.

The two types of soil drainage are subsurface and surface.

61 1) Subsurface drainage is accomplished by the installation of underground tile. This operation is expensive and requires special equipment. It is used primarily where soil drainage is very poor.

2) Surface drainage uses ditches to carry excess water away from crops. The ditches should be well planned and constructed by a dragline, grader, scraper, bulldozer, land leveler or ditching machine. The rows should run parallel to the field ditches and sharp curves should be avoided to lessen soil erosion on the ditch banks.

For drainage ditches to remove at least two inches of water in 24 hours, they should be 12 to 24 inches deep, and 50 to 150 feet apart. The ditch should be V-shaped so it can be mowed easily and crossed with machinery. If ditches are allowed to be blocked by trash, old cane, tree roots, and weeds they cannot function to the fullest.

c. Irrigation

It takes many gallons of water to produce a crop; therefore, the moisture content of the soil is very important. Moisture content may be determined by laboratory tests and expressed as a percentage of the dry weight.

Plants will show us when they are thirsty by turning a dark, bluish-green color. The soil should be moist at six inches deep and must be watched closely during periods of dry weather to determine the time to irrigate.

If irrigation is necessary, the water should be applied at about ¼ to one inch of water per hour. If applied slowly, the water will soak into the soil and run-off will be reduced.

There are three types of irrigation systems; sprinkler, surface, and underground (subirrigation).

1) In the sprinkler system, nozzles are mounted on the sprinkler heads which are mounted on risers attached to lateral pipes. Sprinklers are commonly used in nurseries or where the system may need to be portable.

2) Surface irrigation can be used in many ways. Basically, the water is allowed to flow throughout the field in a certain pattern of ditches or by sheet action. The methods range from furrow irrigation to controlled flooding such as rice field flooding.

3) Underground irrigation requires an abundance of water, a sandy loam topsoil through which water will move freely by capillary attraction, and an impervious subsoil which will hold the water. It requires a large amount of water and great expense involved in laying the tile pipes.

C. Student Activities

1. Students can conduct an organic matter experiment to show how organic matter affects the water-holding capacity of the soil (See operation sheet).
2. Have students conduct an erosion experiment to show how sod prevents soil erosion (See operation sheet).
3. Have students conduct a soil drainage experiment to show the effects of compacted soil on plant growth (See operation sheet).
4. Have students observe a garden plot project for possible drainage or moisture loss problems. Have them apply at least one method of control or use one preventive measure to control moisture (mulch).

5. Arrange to tour a farm with an improved drainage system or an improved irrigation system for crops.

D. Suggested Study Questions

1. Define the terms found in the lesson.
2. Name three ways good tillage and organic matter improve the soil.
3. In what form may organic matter be added to the soil?
4. What precautions should be followed in planting after applying organic matter?
5. List and give uses of different types of mulches used in your community.
6. Distinguish between the two types of soil drainage.
7. Name and describe the three types of irrigation systems.
8. How does organic matter affect the water-holding capacity of a soil?
9. Explain how sod protects the soil.

Operation title: Organic Matter Experiment

Purpose: To determine how organic matter affects the water-holding capacity of the soil.

Conditions or situations for operation: space for drying soil samples.

Equipment, tools, and materials:
1. Two old-fashioned lamp chimneys or plastic cylinders/group
2. Two glass containers (qt. jars)/group
3. Two plastic bags (qt. size)/group
4. Two 12 inch squares of fine-weave cloth material
5. String

Procedure:
1. Obtain a soil sample (1 qt.) from a field where grasses and legumes have been grown and another soil sample from an old cultivated field. Place in plastic bags and label.
2. Spread soil out on paper and let dry for one week.
3. Place cloth over one end of each tube and tie.
4. Place a soil sample from each location in one of the two cylinders.
5. Put in glass jars, cloth end down, but make sure the cylinder doesn't touch the bottom of the jar.
6. Slowly pour one pint of water into each cylinder.

Precautions: Make sure cylinders will fit inside jars but will be supported above the bottom of the jar.

Evaluation: Which soil held the most water?

Why?

65 OPERATION SHEET

Operation title: Erosion experiment

Purpose: To show how sod protects soil

Conditions or situations for operation: none

Equipment, tools, and materials:

1. Two small boxes about 16 inches long, 12 inches wide, and 4 inches deep. Line with plastic and cut a V-shaped notch 1-1½ inches deep in one end of the box.
2. Two sticks of wood about 1 inch thick
3. Two water sprinklers
4. Two half-gallon wide-mouth jars

Procedure:

1. Fill one box with a piece of sod from a pasture or lawn. Trim the grass to about 1 inch height.
2. Fill the other box with the same kind of soil but without sod.
3. Set box on table with stick under unnotched end. Let notched end hang over end of table with jars on stools below.
4. Sprinkle same amount of water slowly on each box holding the same distance above the boxes.

Precautions: Make sure to hold sprinklers same distance from boxes and use the same amount of water.

Evaluation: What happened?

Which box lost the most soil?

Out of which box did the water stop running first?

Why?

Operation title: Soil Drainage Experiment

Purpose: To show effect of compacted soil on plant growth and to show value of air and water moving freely in the soil.

Conditions or situations for operation: none

Equipment, tools, and materials:
1. Three-one-gallon cans/group
2. Garden soil
3. Bean and corn seed
4. Piece of wood to pack soil

Procedure:
1. Label cans and punch four to five holes in cans #1 and #3.
2. Fill cans with garden soil.
3. Plant four seeds in can #1 and pack soil firmly but not too tightly. This represents a field with good drainage.
4. Plant four seeds in can #2. This can has no holes in it. This represents a field with poor drainage because ditches do not carry water away.
5. Use piece of wood to pack soil in can #3 as tight as possible to within one inch of top. Place seeds on top of soil and cover with soil packed firmly but not too tight. The top will represent the plowed section and the packed part will represent the hardpan in the field.
6. Place all cans in a warm place where they will get sunshine.
7. Water all the cans every four to five days using all the water the soil will take.
8. Watch closely for 30 days and record your results.
9. After 30 days remove plants from soil and wash soil from roots. Record your results.

Evaluation: How many seeds came up in each can?

#1 ______________

#2 ______________

#3 ______________

What was the height and color of the plants in each can after 14 days?

	Height	Color
#1		
#2		
#3		

Which can had the most roots?

Which can had the roots going deepest into the soil?

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT III: Insects Affecting Plants

LESSON 1: Types of Common Insects and Their Life Cycles

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify harmful and beneficial insects and identify their life cycles.

2. Specific:

a. Define new terms related to insects.
b. Identify beneficial insects and describe how they are helpful.
c. Identify harmful insects and describe how they are destructive.
d. Identify the three body regions of the insect.
e. Identify the types of life cycles of insects.
f.

g.

h.

B. Review Teaching Material

1. A Basic Program in Plant Science. La. State Dept. of Education and LSU School of Voc. Educ., 1969. pages 154-179.

2. Texas Vocational Material. Unit D - Insect and Disease Control: Topic - Identification and Control of Insects.

3. Handbook of the Insect World. Cooperative Extension Service, 1979.

C. Special Arrangements

1. Materials

   a. Specimens of common insects that affect plants

   b. Plants and/or fruit damaged by insects

   c. Healthy, undamaged plant or fruit of same species

   d. Materials needed for making an insect collection

2. Travel

   Student excursions to collect insects

3. Audio-visual equipment

   a. Overhead projector/transparencies

   b. Slide projector/screen (optional)

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Display and identify common insects (may wish to use slides or specimens).

2. Display and compare plant and fruit specimens that have been damaged by insects to healthy specimens.

3. Discuss students' experiences with insect damage or diseases caused by insects.

4. Invite a beekeeper to speak to class about raising bees for profit.

B. Content Outline

1. Terms

a. Anatomy

1) Appendages -- any of the external or subordinate parts

2) Abdomen -- third posterior division of an insect

3) Thorax -- second of the body segments

4) Exoskeleton -- one found on outside of body

5) Compound eye -- one which is made up of many facets

6) Spiracles -- openings along sides of insect that take in oxygen to be used by insect

b. Life Cycle

1) Molt -- to shed the outer skeleton during growth

2) Metamorphosis -- series of changes which take place in development

3) Incomplete metamorphosis -- insect undergoes changes but resembles adult

4) Complete metamorphosis -- complete transformation

5) Cocoon -- silken covering constructed for protection of pupa

6) Larva -- wormlike stage of the insect in the complete metamorphosis

7) Pupae -- resting stage and the stage in which transformation takes place

8) Adult -- stage in which no further transformation occurs

9) Predator -- insect that feeds upon another insect or one of the stages of its host

10) Maggot -- legless larva without well-defined head

11) Nymph -- young insect

2. Parts of an Insect

An insect is a small animal with three clearly defined body regions and three pairs of legs. The three body regions are:

a. Head -- has one pair of antennae and mouth parts

b. Thorax -- bears three pairs of legs and wings (if applicable)

c. Abdomen -- may have many sections but never bears legs.

(Transparency III-1-A)

Insects are grouped under the large heading (phylum) of Arthropoda in the animal kingdom. Also found in this group are spiders, ticks, mites, centipedes, and scorpions although they are not insects. In order to be classified as an insect, the animal must have:

1) An outside (external) skeleton

2) Body divided into three sections

3) Three pairs of jointed legs

4) One pair of antennae (feelers)

3. Classification of Insects

It is important in the agricultural industry to recognize that insects can be a major factor in the success or failure of a crop. It is important to be able to differentiate between harmful insects and beneficial insects. Also, knowledge of the insects' feeding habits, life cycle, and reproductive system is a major step toward combating insect damage to plants.

Insects may be classified according to the way that they feed on plants.

a. Chewing insects
This group bites off, chews, and swallows plant parts. The insects are equipped with strong biting and chewing mouth parts that act like scissors. Common chewing insects are grasshoppers, beetles, and caterpillars. (Transparency III-1-B&C)

b. Sucking insects
These insects either rasp or pierce the epidermis (outer layer) of the plant and suck sap from the cells. They are equipped with a proboscis or sharp hypodermic-like snout. Aphids, plant bugs, leaf hoppers, mealy bugs, and scales are sucking insects. Butterflies and moths are siphoning insects; wasps and bees are chewing-lapping insects; and thrips are rasping-sucking insects. (Transparency III-1-C)

Insects may be harmful or beneficial. Harmful insects may damage our homes, livestock, or ourselves. They may reduce yields, lower the quality, or even destroy an entire crop. Insect control is expensive in terms of cost of equipment and cost of materials needed to combat insect damage. Beneficial insects are considered "friends of man." (Transparency III-1-D)
They may:

1) Improve the soil

2) Act as pollinizers and produce honey

3) Destroy harmful insects

4) Serve as food for birds, fish, and wildlife

Some beneficial insects of various crops are:

1) corn -- honeybee, lady beetle, wasp

2) cotton -- bumble bee, honeybee, lady beetle

3) small grain -- lady beetle, honeybee, wasp

4) soybean -- honeybee, lady beetle

5) vegetable crops -- bumble bee, lady beetle, honeybee, wasp

6) fruit and nut -- honeybee, bumble bee, lady beetle, wasp

Other beneficial insects may be found in the Handbook of the Insect World published by the Cooperative Extension Service.

Harmful insects of various crops include: (Transparencies III-1-E&F)

1) corn -- corn ear worm, grasshopper, white grubs, chinch bugs, European corn borer, fall army worm

2) cotton -- boll weevil, boll worm, cotton aphid, cotton flea hopper, cotton leafworm, pink bollworm, spider mite

3) small grain -- grasshopper, wheat joint worm, Hessian fly, white stem sawfly

4) soybean -- Mexican bean beetle, velvet bean caterpillar

5) vegetable -- tomato horn worm, Mexican bean beetle, Colorado potato beetle, harlequin bug, cucumber beetle, potato leaf hopper, squash vine borer, tomato fruit worm, sweet potato weevil, seed corn maggot, pea weevil, beet leaf hopper, Pacific coast wireworm, onion thrip, cut worm, pea aphid, pickle worm, clay back cutworm

6) fruit and nut -- oriental fruit moth, apple maggot, codling moth, plum cuculio, two-spotted spider

mites, San Jose scale, citrus mealy bug, white fringe beetle

7) ornamentals and shrubs -- Japanese beetle, gypsy moth, elm leaf beetle, Ips bark beetle, red-headed pine sawfly, leaf hoppers, cicada, June beetle, white fringe beetle, mealy bug, scale

4. Life Cycle of the Insect

The stages of development of the insect are known as metamorphosis. These developments are grouped into three types. (Transparencies III-1-G&I)

a. No metamorphosis (ametabola)
No metamorphosis is development without change, other than increase in size and growth of the reproductive organs, from the time the insect appears until it is an adult. Examples are silverfish, bristletails, and springtails

b. Incomplete metamorphosis
Incomplete metamorphosis is development in which the insect goes through marked changes but still resembles the adult. These changes are as follows: egg, nymph, and, after about five molts adult stage. Examples are grasshoppers, bugs, leaf hoppers, and thrips

c. Complete Metamorphosis
Complete metamorphosis is a complete transformation. The young have no resemblance to the adult. The insect goes through several stages including the egg, larva, pupa, and adult. Examples of insects wih complete metamorphosis are beetles, moths, fireflies, flies, bees, wasps, and fleas. (Transparency III-1-H)

C. Student Activities

1. Have students make an insect collection of adult insects. Have them mount and correctly identify the specimens. The Handbook of the Insect World, as well as

other publications are available to help students identify the insects (Refer to Operation Sheet).

2. Have students make a poster identifying the life cycle stages pointing out the destructive stage of one insect. Have them explain and display the poster. May suggest using cut outs from magazines, etc.

D. Suggested Study Questions

1. Define the terms found in the lesson.
2. What is an insect?
3. Name the three body regions of an insect.
4. Name other arthropod pests.
5. What four characteristics are common to all insects?
6. Classify insects according to how they feed on plants.
7. How are insects beneficial? Give examples.
8. List harmful insects of common crops grown in the community.
9. List the three stages of incomplete metamorphosis.
10. List the four stages of complete metamorphosis.

Operation Title: Making an Insect Collection

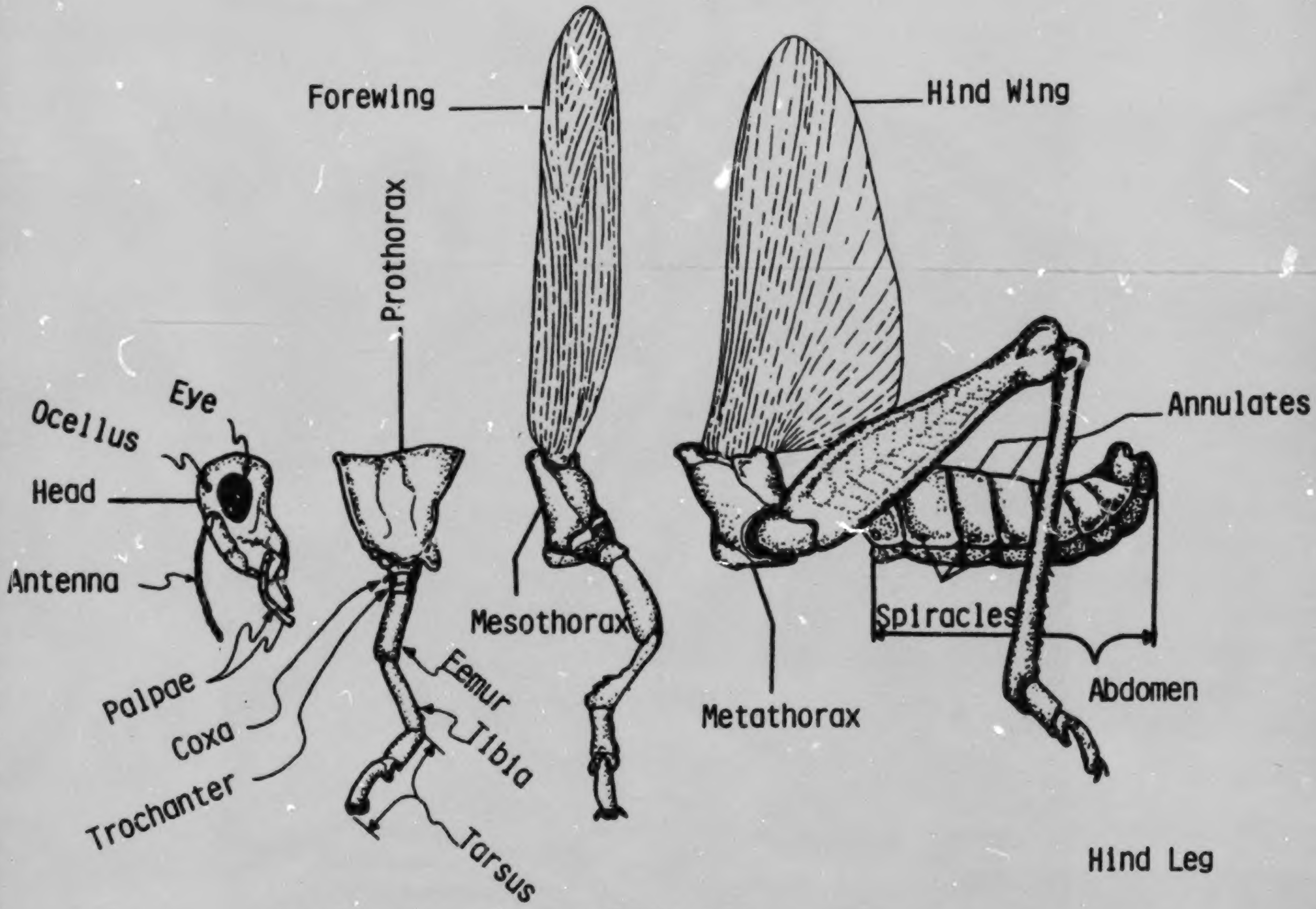
Purpose: To identify and study insects common to area

Conditions or situations for operation: Insects should be whole with no broken or missing parts

Equipment, tools, and materials:
1. Insect identification guides (available from parish Cooperative Extension Service)
2. Cork, styrofoam, or other similar material
3. Cigar boxes or insect boxes
4. Moth balls or crystals
5. Insect pins
6. Envelopes
7. Glue
8. Labels
9. Kill jar

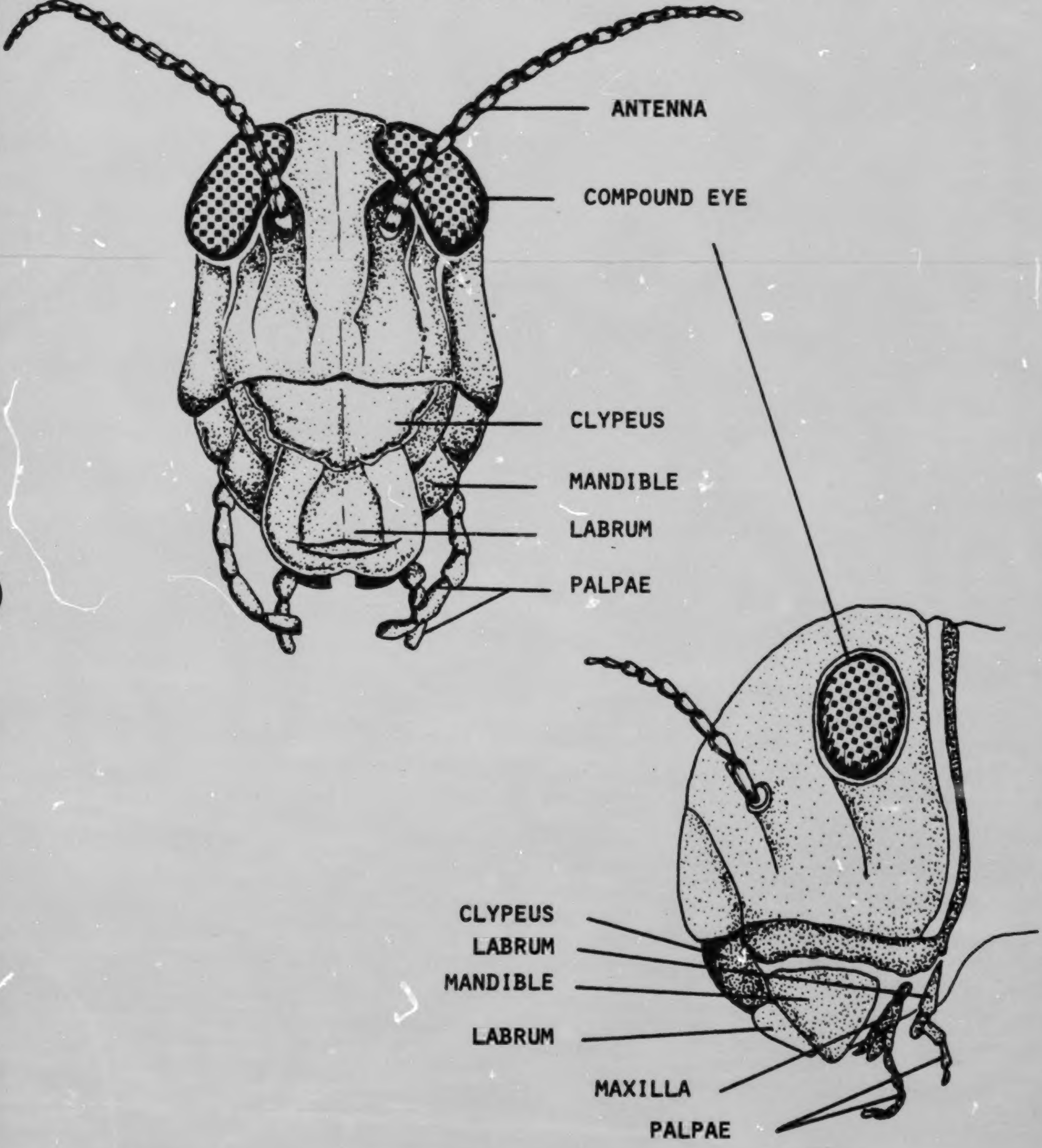
Procedure:
1. Prepare insect box and kill jar.
2. Collect insects and place immediately in kill jar. Envelopes will help keep butterflies' and moths' wings intact.
3. Pin large insects through thorax slightly right of the center of the back.
4. Mount small insects on triangles of paper pierced by pins.
5. Spread wings of butterflies and moths when relaxed.
6. Label all insects with name of insect, date collected, and place collected.
7. Place moth balls or crystals in box under styrofoam.

PARTS OF THE INSECT


Forewing
Hind Wing
Prothorax
Eye
Ocellus
Head
Antenna
Palpae
Coxa
Trochanter
Femur
Tibia
Tarsus
Mesothorax
Metathorax
Annulates
Spiracles
Abdomen
Hind Leg
Foreleg
Middle Leg

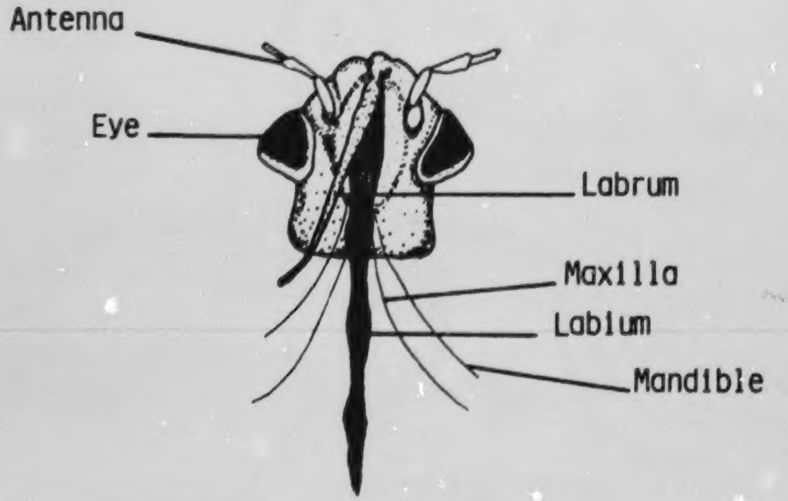
Transparency III-1-A

CHEWING MOUTHPARTS


ANTENNA
COMPOUND EYE
CLYPEUS
MANDIBLE
LABRUM
PALPAE
CLYPEUS
LABRUM
MANDIBLE
LABRUM
MAXILLA
PALPAE

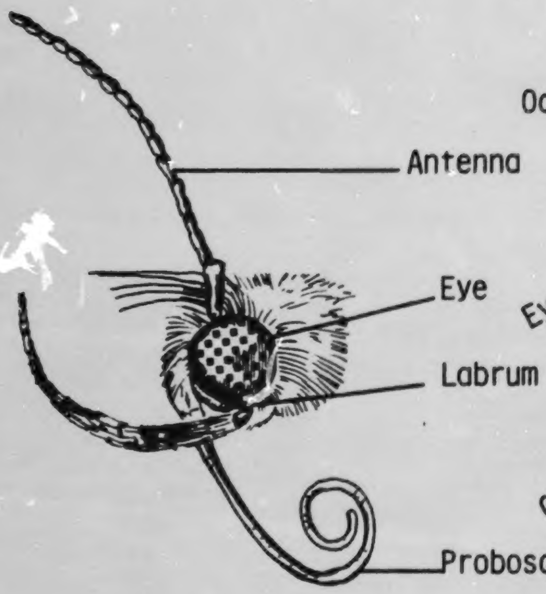
Transparency III-1-B

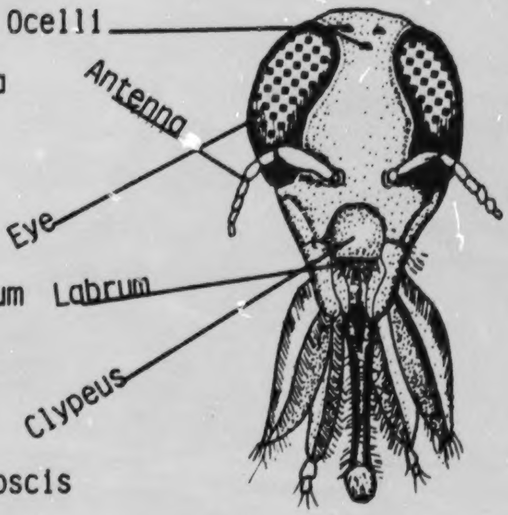
OTHER TYPES OF MOUTHPARTS


Antenna
Eye
Labrum
Maxilla
Labium
Mandible

PIERCING - SUCKING

APHIDS, MEALY BUGS, SCALES


Antenna
Eye
Labrum
Proboscis


Ocelli
Antenna
Eye
Labrum
Clypeus

Siphoning

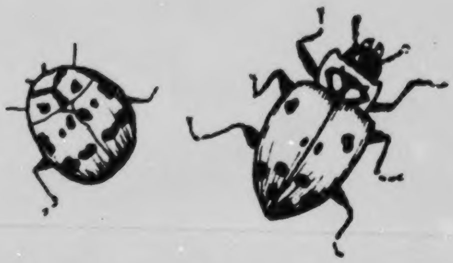
Butterflies, Moths

Chewing - Lapping

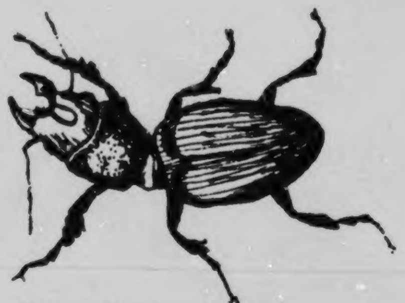
Wasps, Bees

Transparency III-1-C

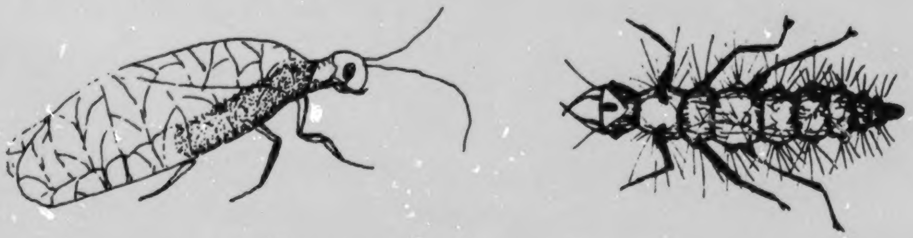
INSECT DAMAGE



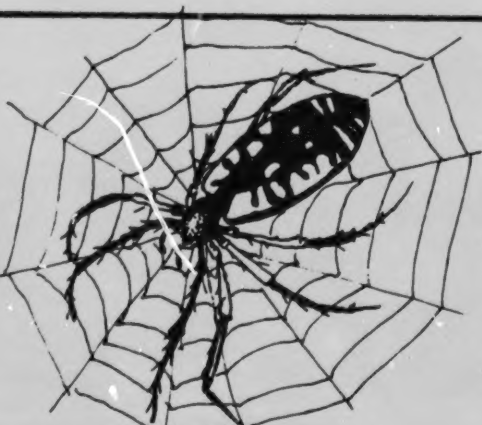
Lady Beetles Feed on Aphids and Soft-Bodied Insects



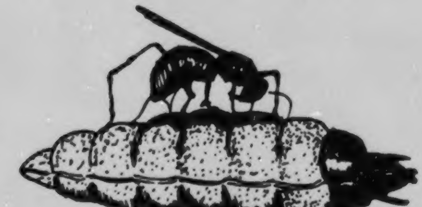
Ground Beetle and Larva Feed on Insects



Lacewing Larva and Adult Larva (Aphidlion) Feed on Aphids

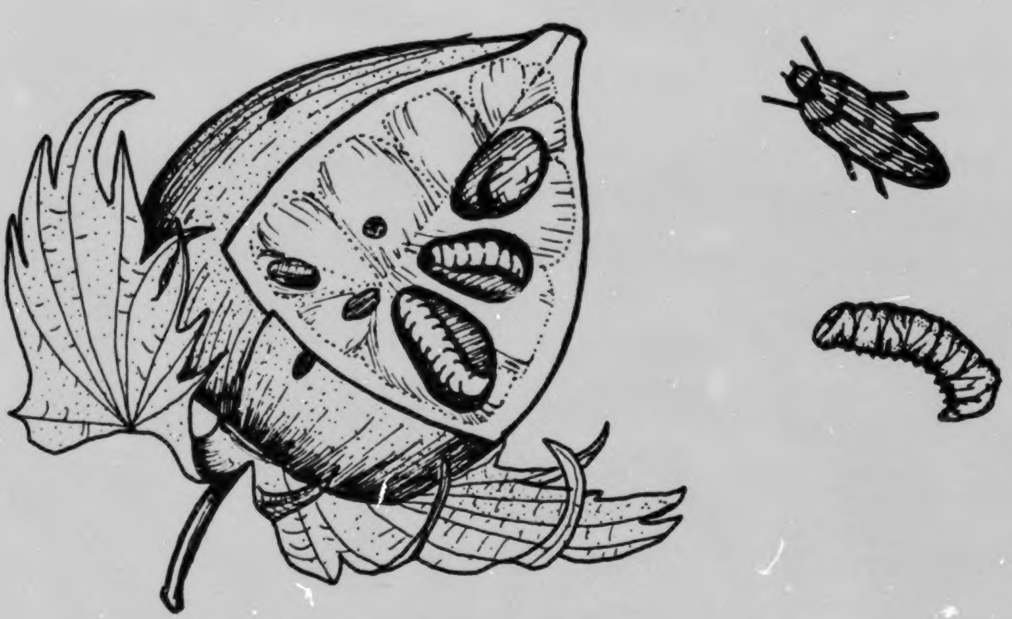


Many Kinds of Spiders Destroy Insects

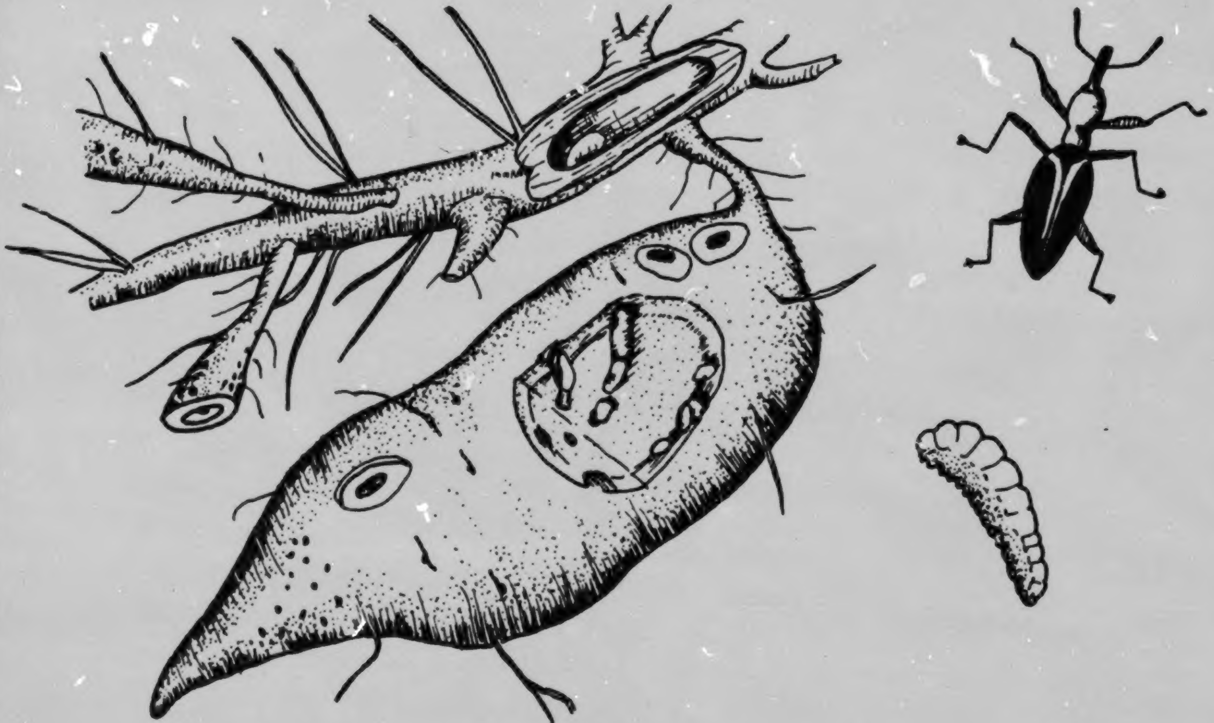


Female Bracon Hebator Laying Eggs in Larva

INSECT DAMAGE



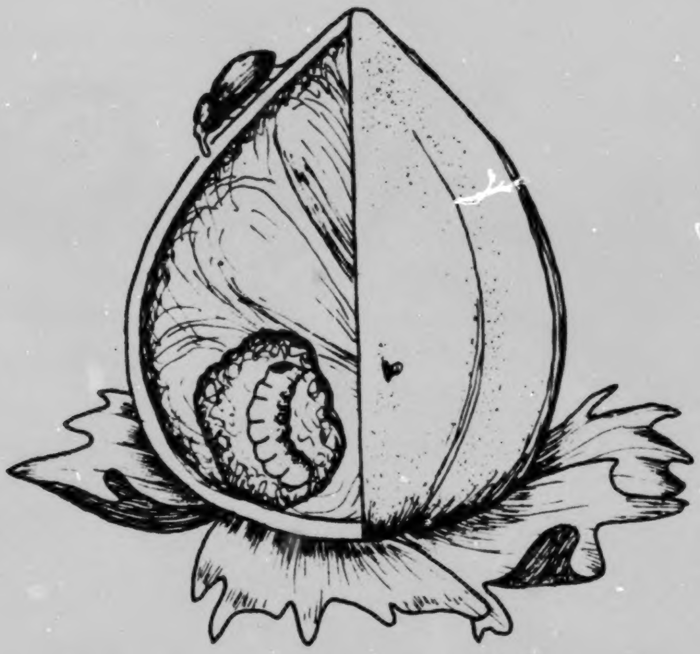
BOLL WEEVIL



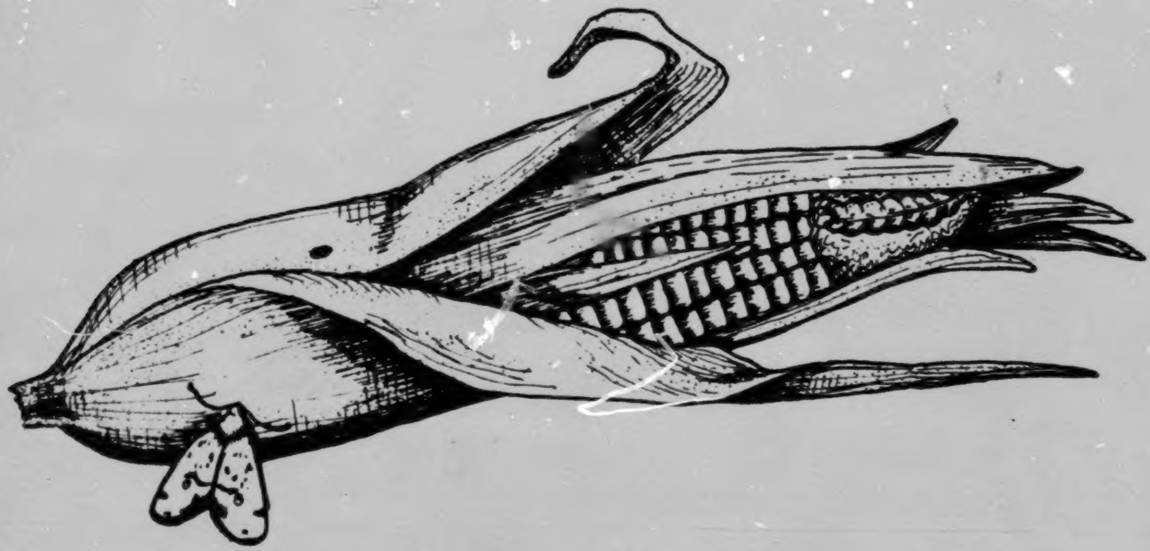
SWEET POTATO WEEVIL

TRANSPARENCY III-1-E

INSECT DAMAGE



BOLL WEEVIL



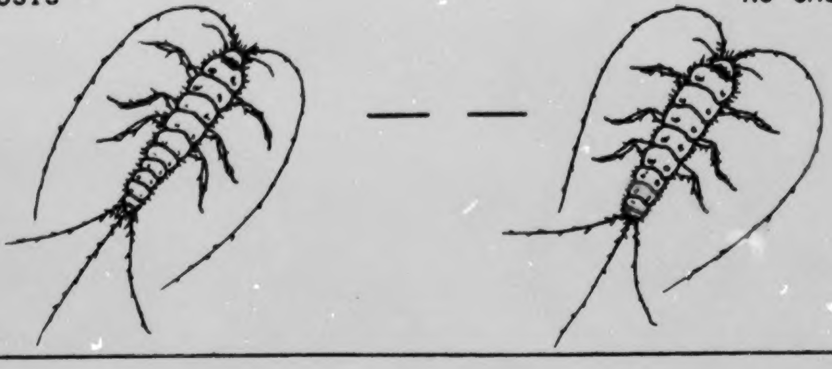
CORN EARWORM

Transparency III-1-F

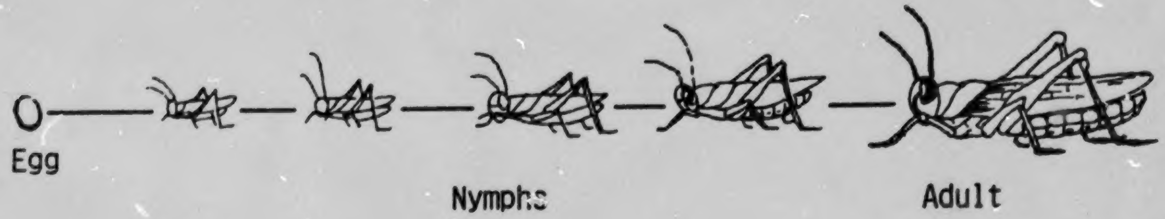
INSECT METAMORPHOSIS

No Metamorphosis

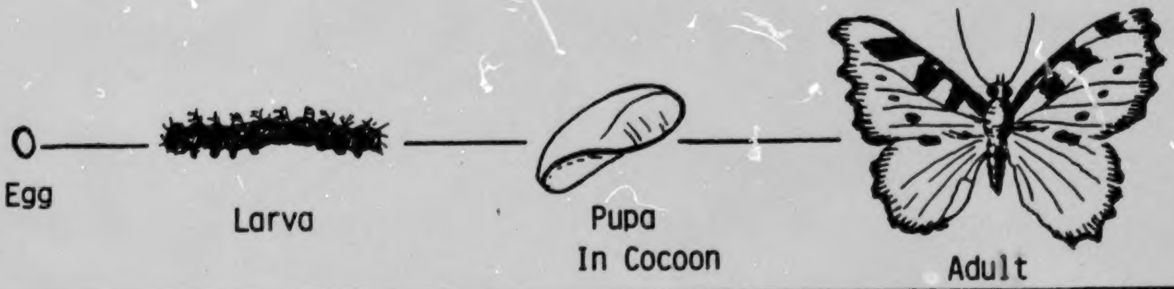
No Change



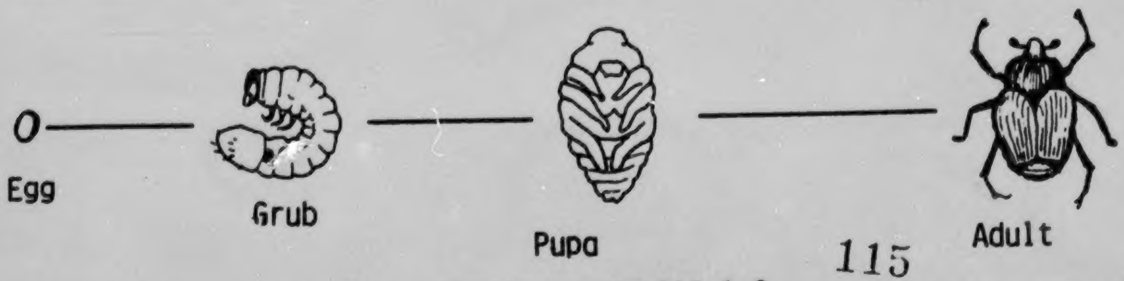
Incomplete Metamorphosis - Gradual Change


Egg
Nymphs
Adult

Complete Metamorphosis - Complete Change


Egg
Larva
Pupa
In Cocoon
Adult

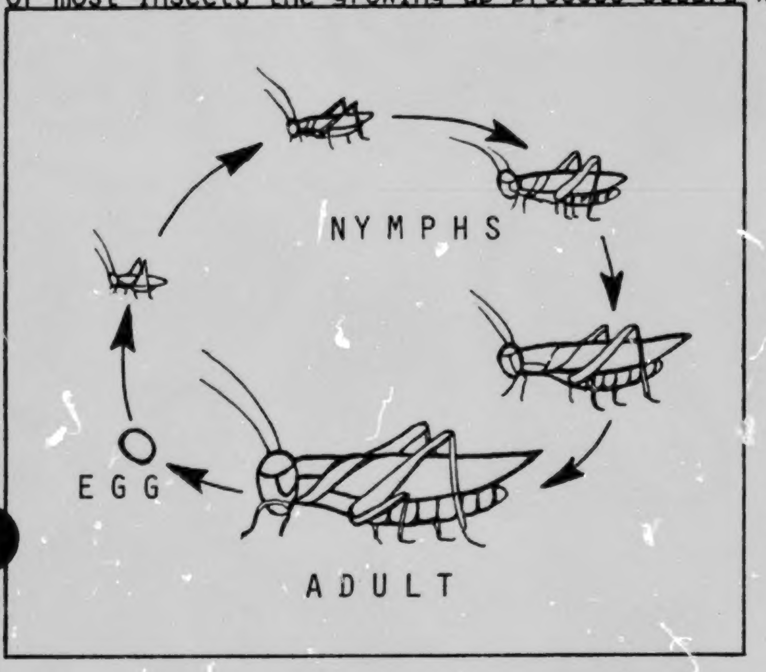
Complete Metamorphosis


Egg
Grub
Pupa
Adult

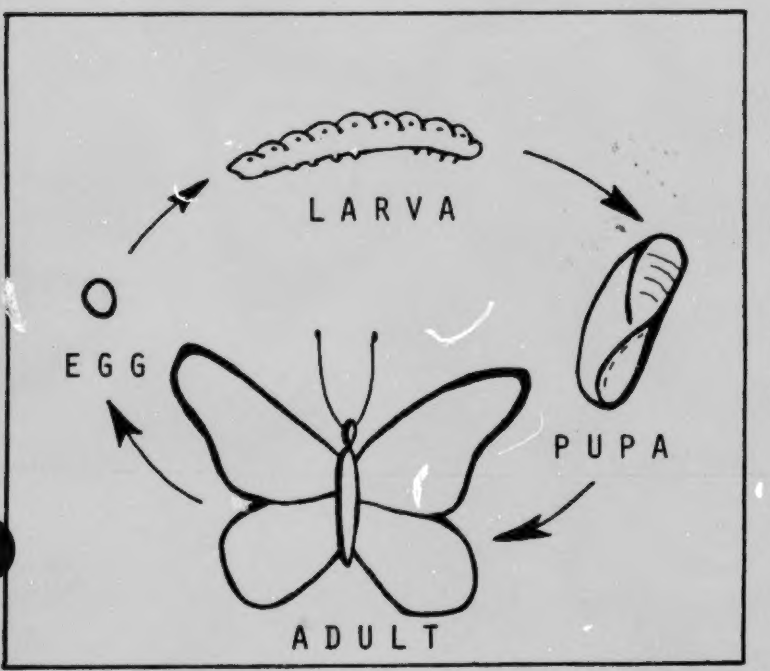
Transparency III-1-G

HOW INSECTS GROW UP

Insects thrive because they are able to adapt themselves to the world as they find it. This is clearly shown in their ingenious ways of reproduction. Most insects grow from egg to adult by means of one of two schemes, i.e., gradual growth or complete change. The eggs are deposited near a food supply, and for most insects the growing-up process occurs without help from the parents.

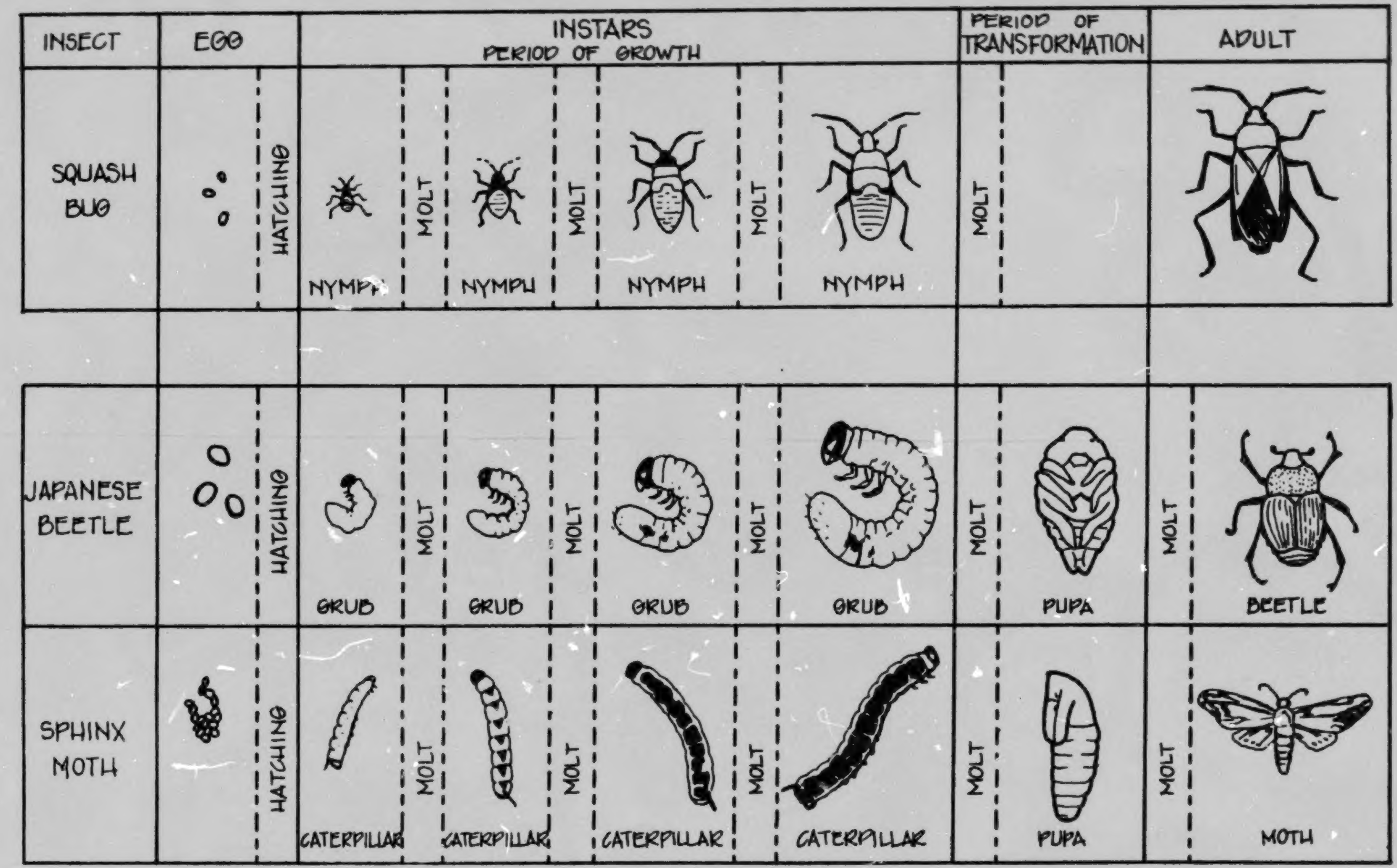


The grasshopper is an example of gradual growth. The egg hatches, and the tiny insect resembles the adult minus fully developed wings. Through a molting process, the insect sheds its hard skin several times as it grows from the young nymph to the adult.



The familiar butterfly is an example of complete change or metamorphosis. From the egg comes the caterpillar, which when fully grown transforms into a pupa or cocoon stage, from which later emerges the pretty butterfly seen flitting about.

Transparency III-1-H


INSECT
EGG
INSTARS
PERIOD OF GROWTH
PERIOD OF TRANSFORMATION
ADULT
SQUASH BUG
HATCHING
NYMPH
MOLT
NYMPH
MOLT
NYMPH
MOLT
NYMPH
MOLT
JAPANESE BEETLE
HATCHING
GRUB
MOLT
GRUB
MOLT
GRUB
MOLT
GRUB
MOLT
PUPA
MOLT
BEETLE
SPHINX MOTH
HATCHING
CATERPILLAR
MOLT
CATERPILLAR
MOLT
CATERPILLAR
MOLT
CATERPILLAR
MOLT
PUPA
MOLT
MOTH

INSECT METAMORPHOSIS

Metamorphosis or growth stages of a sucking insect (squash bug) with gradual metamorphosis; and also of a bettle and a moth (chewing insects) with complete metamorphosis.

Transparency III-1-I

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT III: Insects Affecting Plants

LESSON 2: Control of Insects

I. Preparation for Instruction

A. Student Objectives

1. Terminal: List the methods for insect control and be able to use pesticides properly.

2. Specific:

   a. Define new terms related to insect control.
   b. List methods of insect control and give examples of each method.
   c. Name ways that insects may be killed by insecticides and the type of insect against which each is most effective.
   d. List the name and characteristics of the three major groups of insecticides according to their chemical makeup.
   e. Name seven types of insecticide formulations and discuss how they are applied.
   f. Name three ways that poisons may enter the insect's body.
   g. List general safety precautions for mixing and applying pesticides.
   h. Identify all parts of a pesticide label.
   i.

   j.

   k.

B. Review Teaching Material

1. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar

Publishers, Inc. Albany, N.Y. 1979.
Pages 183-203.

2. A Basic Program in Plant Science. Louisiana State Department of Education, 1969. Pages 180-185.

3. Texas Vocational material Unit D -- Insect and Disease Control: Topic 1 -- Identification and Control of Insects, and Topic 3 -- Safe Application of Agricultural Chemicals.

4. Applying Pesticides, AAVIM. (American Association for Vocational Instructional Materials) Athens, Georgia.

C. Special Arrangements

1. Materials

   a. Pesticide containers

   b. Pesticide application equipment

   c. Materials for student demonstrations; protective clothing, measuring utensils, etc.

2. Travel

   Student trips to survey insect damage to plants

3. Audio-visual equipment

   Overhead projector/transparencies, slides

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss student experiences in insect control. Have them relate how they think insects are best controlled.

2. Display chemicals and equipment used in controlling insects (one of each type of formulation if possible).

3. Invite entomologist or chemical sales representative to speak to class on importance of practical, safe insect control and careers in insect control.

4. Invite a representative from the EPA to speak to class on proper use of chemicals.
5. Sit in on Cooperative Extension Pesticide Applicators Certification workshop.

B. Content Outline

1. Terms

a. Systemic Pesticides -- compounds which enter a plant through its vascular system to control sucking and chewing insects

b. Toxic -- poisonous

c. Active ingredient -- chemical that is poisonous to insect being treated

d. Shelf life -- amount of time a product can be stored

e. Inert ingredients -- compounds used to dilute or aid in application of pesticide

f. Pesticide -- chemical compound used to control pest

g. Predatory -- feeds off other animals

h. Insecticide -- chemical compound specifically for control of insects

2. Methods of Plant Insect Control

Man is constantly fighting certain insects which reduce crop yields. Insects can cause plant problems through their feeding habits or by introducing fungi, bacteria, or viruses which in turn cause plant problems.

By knowing the eating habits and life cycle of insects, man will be able to employ effective control measures by applying chemicals and developing resistant varieties of plants in order to win the constant battle.

In order for any insect to grow and develop, three conditions must exist.

a. The insect responsible for the damage must be present.

b. A favorable environment must exist.

c. The crop must be susceptible.

Insects may be controlled by any one or more of the following methods.

a. Natural Control
Nature limits the number of plants to keep them in balance. This method includes:

   1) Climate, temperature, rainfall, sunshine

   2) Physical factors -- soil type, location, water, lakes, ponds, seas, plants, and animal life

   3) Predatory insects, fish, birds, mammals, and reptiles

   4) Diseases such as fungi, bacteria, and viruses

b. Artificial Control

   1) Mechanical and Physical Control -- screening, paper, tin, plastic, temperature control, insect traps, soil tillage, colored lights, and many more

   2) Cultural Control -- rotation of crops, tillage, clean culture, fertilization, planting dates, drainage, improved plant and animal varieties, and sanitation

   3) Biological Control -- using other insects, diseases, parasites, predators, propagation of enemies, sterilization of male insects

   4) Legislative Control Measures -- laws adopted by local, state, and federal government; quarantine laws; cleanup measures; planting and plow-up dates; insecticide, herbicide, fungicide, and germicide laws; packaging and labeling materials

   5) Chemical Control -- may be defined as poison materials that have been synthetically produced to attack

insects. Chemical control uses insecticides which affect the normal function of some part of the insect such as the cells, nerve tissue, and other body parts. The chemical must destroy the insect but leave the plant undamaged.

3. Classification of Insecticides

Insecticides are usually classified according to how they react when placed in contact with the insect. The classifications are:

a. Stomach Poisons
These poisons are materials that are digested by the insect. They kill primarily by affecting the digestive system. This type of insecticide is commonly used to control biting and chewing insects. Systemic poisons act as stomach poisons.

b. Contact Poisons
These poisons are absorbed through the insects' skin or body wall and act on the pest's nervous system. To be killed the insect must come in direct contact with the chemical. These poisons are usually effective in controlling sucking insects.

c. Chemical Sterilants
This insecticide renders the male sterile when treated. They are then released to mate with females producing infertile eggs.

d. Attractants
Attractants function to attract insects to certain places where they are destroyed. They may be food, color, or light.

e. Repellants
Repellants function to repel insects from an area.

4. Types of Insecticides

Insecticides may be grouped according to their chemical makeup. The classifications are:

a. Inorganic compounds
These compounds are generally effective as stomach poisons. They include sulphur, arsenic, copper, boron, fluoride, mercury, zinc, and lead arsenate.

b. Organic compounds
These compounds are derived from plants. They usually work as stomach or contact poisons. Two examples are rotenone and pyrethrum.

c. Synthetic Organic compounds
These compounds are produced in a laboratory and are most widely used as contact poisons. They may be divided into three smaller groups.

    1) Chlorinated hydrocarbons -- these chemicals have long residual control. These poisons remain in the bodies of warm-blooded animals that come in contact with them and they also remain in the environment. DDT, now outlawed in the U.S., is one of the best known chemicals in this group.

    2) Organophosphates -- this group of insecticides is very effective in controlling insects. It also contains some of the chemicals most toxic to warm-blooded animals. Organophophates may be absorbed rapidly through the skin. They break down quickly in the environment and do not build up in the bodies of warm-blooded animals. Malathion is a relatively safe chemical in this group that can be used to control many insects.

    3) Carbamates -- this group of synthetic organics contain some of the safest insecticides on the market. They are slightly toxic to warm-blooded animals but break down rapidly and leave no residue in the environment or in the bodies of animals. Carbamates are somewhat selective in that they may kill only certain insects.

5. Types of Insecticide Formulation

a. Dusts (D)
Insecticides are applied with dusters if purchased as dusts. The active ingredient is already diluted when purchased and requires no mixing. Dusts are easy to apply with inexpensive equipment, but tend to blow or drift from the plant being treated. The symbol for dust is D.

b. Wettable Powders (WP)
Wettable powders resemble dusts in appearance but are concentrated and must be diluted with water before application. Wettable powders tend to settle while in solution and must be stirred while being sprayed. Less drift occurs with a water-mixed spray.

c. Emulsifiable Concentrates (EC)
Emulsifiable concentrates are liquids which are mixed with water. The concentrate is safer to handle since there is no dust to blow during mixing. They do not settle and separate from the solution and give good coverage of plants. The shelf life is usually longer for dust or powder if the container is kept closed and stored in a cool, dark place.

d. Granules (G)
Granules are insecticides in the form of small pellets. They are spread on the soil surface where they either penetrate the soil after the application of water, or turn into gases which fumigate the insects. Systemic insecticides may be sold as granules. They are applied to the soil as granules, watered and then absorbed by the plant roots.

e. Baits (B)
These are poisonous materials which attract insects. The pest eats the bait and is killed by the poison. Slugs, snails, cutworms, grasshoppers, and weevils are at times controlled in this manner.

f. Aerosols

Aerosol insecticides are contained in pressurized cans. They are usually used for small insect control jobs around the house or greenhouse. The chemical is already diluted and ready to use.

g. Fumigants

This insecticide is a liquid in a pressurized container that changes to a gas when released into the air.

6. Application of Insecticides

The success of insecticides depends largely on their application. There are basically two types of equipment used, sprayers and dusters. Hand sprayers are commonly used by horticulturists. They may be compressed air sprayers that must be pumped by hand or powered by a motor. Larger motor or engine driven sprayers are used in airplanes and large equipment. All types of sprayers should be rinsed with clean water after use. Nozzles and hoses should be cleaned seasonally. (Transparency III-2-A)

Dusters are available in a number of designs. The plunger-type is used for most small jobs. Bellows and rotary fan dusters can handle larger jobs. Mist-blowers are portable and use blasts of air to disperse dust.

Whatever method of application is used, it is important that the proper amount of the chemical is applied to a given area. This requires calibration of sprayers and dusters. Calibration involves measuring the amount of chemical applied during a specified period of time or measuring area and then adjusting the applicator or speed of application to obtain the proper amount of chemical required. Dusts and sprays must be applied so that there is total coverage of all leaf surfaces.

7. Safe Use of Pesticides

Because pesticides can be poisonous to humans, animals, and the environment, the

U.S. has established standards for their handling and use by the Environment Protection Agency (EPA).

There are three main routes by which poisons enter the body. (Transparency III-2-B)

a. oral contact (by swallowing)

b. dermal contact (by contact with the skin)

c. inhalation (by breathing)

Acute toxicity is a measure of how poisonous a pesticide is after a single exposure. Chronic toxicity refers to how poisonous a pesticide is over a period of time and after repeated exposures. It refers to chemicals that build up in the body.

Safety precautions must be considered before beginning to mix or apply a pesticide. Adequate safety precautions include:

a. Reading the label carefully

b. Checking the recommended uses

c. Having clean water and detergents available to wash spills

d. Wearing protective clothing -- rubber gloves, a respirator, a hat, and any other protective clothing called for on the label. Some pesticides require little protective clothing while others require complete coverage with water-proof materal

e. Use extra caution with concentrated chemicals. Protective clothing is especially important when handling the concentrated chemicals in mixing and filling the spray tank. Always wear rubber gloves, goggles, and a long water-proof apron (Transparency III-2-D)

f. Apply the chemical with care. Allow for as little drift as possible to avoid affecting other areas and to avoid waste.

g. Always mix just enough for the job at hand.

h. Guard against inhalation or ingestion (swallowing). Never eat or smoke while handling pesticides.

i. Consider weather conditions. Strong winds, rain, or extreme temperatures are not ideal for applying pesticides.

j. Store and dispose of chemicals properly. Store all pesticides in the original container. Keep in a locked area away from children and animals. Do not store near foods, animal feed, fertilizer, people, or animals. (Transparency III-2-E)

If the warnings mentioned earlier are not needed, or if accidental spillage results in poisoning, it is important that any symptoms of poisoning be recognized quickly. If poisoning is suspected, call a doctor and save the pesticide container or label for him to see. Remove all contaminated clothing and wash victim under running water with detergent. Wrap victim in a warm blanket until medical help arrives. If pesticides get into the eyes, they should be flushed with clean water for at least five minutes.

For inhaled poisons, carry the victim to fresh air. Apply artificial respiration if breathing has stopped. Keep the patient warm and quiet. Save the container and call for medical help.

8. Interpretation of Pesticide Labels

All containers for pesticides are required to have a label. Before purchasing any pesticide, read and understand the label. (Transparency III-2-C)

The label will contain the following information:

a. Use Classification
   Restricted or nonrestricted use means either a certified or noncertified applicator may apply the insecticide.

b. Brand name and common name

c. Chemical name and formulation

d. Ingredients -- will show amount of active ingredients and inert ingredients.

e. Signal word and practical treatment of first aid -- the words danger and poison and the skull and crossbones means the insecticide is highly toxic; the word warning means moderately toxic; caution means slightly toxic.

f. Directions for use -- usually gives the insect controlled, method of mixing the insecticide, and amount to use.

g. Re-entry statement -- explains hazards of the use of the insecticide.

h. Storage and Disposal -- how and where to store the chemical and how to dispose of empty containers. Always store pesticides in their original container.

i. Name and address of manufacturer

j. EPA registration and establishment number

k. Net contents -- now, almost always given in metric measures

C. Student Activities

1. Have students survey local area for insect damage to plants. Identify insects involved and select the proper pesticide for effective control.

2. Have several students demonstrate safety practices used with insecticides. Students may demonstrate proper use of equipment, calibration, protective clothing, first aid, mixing, application, etc.

3. Have each student collect a label from a pesticide container and identify each part of the label.

D. Suggested Study Questions

1. Define the terms found in the lesson.
2. List the three conditions necessary for the insect to grow and develop.
3. Name methods for natural insect control.
4. List the artificial methods of control of insects.
5. Differentiate among the six classifications of insecticide.
6. List the types of insecticides according to their chemical makeup.
7. List the types of insecticide formulation.
8. What are three main ways by which poisons enter the body?
9. List the information found on a pesticide label.
10. Name safety precautions that must be considered before applying a pesticide.

INFORMATION ON SOME OF THE MORE IMPORTANT INSECTS DAMAGING PLANTS

Insect	Adult Description	Control	Crops Attacked
Alfalfa Caterpillar	Orange-yellow moth, 2 inch wing spread	Parathion, Sevin	Alfalfa, occasionally other legumes
Alfalfa Webworm	Buff to brown, 3/4 inch wing spread	Sevin, Parathion	Alfalfa, vegetables, clover, soybeans, and others
Armyworm	Moth; brownish-gray, 1½ inch wing spread	Sevin, Toxaphene	Corn, grasses, and many other plants
Armyworm (Fall)	Moth; gray, white, or dull colored; 1¼ inch wing	Sevin, Toxaphene	Corn, sorghum, grasses, tobacco, and most plants
Bean Weevil	Brownish-gray beetle, 1/8 inch long	Derris Powder, Rotenone	Beans, cowpeas
Chinch Bug	Soft-bodied bug, black and white wings with spots on them	Malathion, Sevin	Corn, small grains, grasses
Corn Earworm	Moth, yellowish-green or gray, 1½ inch wing spread	Calcium Arsenate, Dibrom Sevin	Corn, cotton, tobacco and many others
Corn Rootworm (Southern)	Beetle, yellowish-green or gray, 12 Black-spots on wing covers, ½ inch long	Dowco 179, Landrin, Furadan, Bux	Corn, small grains, cucumbers
Corn Root Aphid	Aphid, bluegreen, round, winged or wingless	Crop rotation, Plowing deep to break up ant colonies	Corn, cotton, several weeds, grasses
Cornstalk Borer (Southern)	Moth; white to smoky-yellow; 1¼ inch wing spread at rest; wings held close, making acute triangle	Diazinon, Parathion	Corn, sorghum, Johnsongrass

Note: Teachers should check current labels for which pesticide can be used on what crops--this changes from year to year.

Insect	Adult Description	Control	Crops Attacked
Cotton Boll Weevil	Snout Beetle yellowish to almost black	Guthion, Carbaryl (Sevin), Malathion (ULM only), Methyl Parathion, Toxaphene + Methyl Parathion	Cotton
Cotton Boll Worm	(Larva stage) Caterpillar varies from green to almost black	Axodrin, Methyl Parathion, Sevin	Cotton, corn, tobacco, tomato, and many others
Cowpea Weevil	Reddish-brown beetle with two ivory-like robes at base of thorax	Derris Powder, Carbon Tetrachloride Carbon Disulphide Mixture	Cowpeas, other legumes
Cutworm (Several Species)	(Larva stage) Caterpillar, pale brownish to grayish white worms	Endrin, Toxaphene, Sevin, Parathion	Corn, grains cotton, tobacco, clover
Angoumois Grain Moth	Grayish moth, ½ inch wing spread	Carbon Bisulfide	Cereal grains
Granary Weevil	Chestnut brown beetle, similar to rice weevil, 1/16 inch long	Chlordane, Carbon Bisulfide	Cereal grains
Grass-hopper	Varies according to species (several)	Carbaryl (Sevin), Diazinon	Corn, small grains, alfalfa, all crops
Greenbug	Yellowish-green aphid, tiny	Malathion, Methyl Parathion	Small grains, corn, rice, other grasses
Hessian Fly	Mosquito-like fly dark bodied	Delay seeding until flies have emerged	Wheat, barley, rye, and some grasses
Japanese Beetle	Shiny, metallic green, coppery-brown wings and six small patches of white hair along the body	Methoxyclor, Malathion, Rotenone, Sevin	Fruits and ornamentals

Insect	Adult Description	Control	Crops Attacked
Lygus Bug (Several) Species)	Flattened, oval bug, pale green to yellowish-brown, ½ inch long	Dibrom, Parathion, Sevin, Trichlorfon	Alfalfa, cotton, beans, sugar beets
Mites	Four pairs of reddish orange legs, with a dark brown body	Ethion, Parathion	Oats, wheat, barley
Pea Weevil	Grayish-brown, 1/5 inch long	Carbon Bisulfide	Peas
Peach Tree Borer	Wings fully scaled and abdomen is marked with broad orange band	Parathion Spray, Guthion	Peach trees
Pink Bollworm	(Larva stage) Cylindrical, white with pink dorsal side, ½ inch long	Axinphosmethyl (Guthion) Carbaryl (Sevin)	Cotton, okra, hollyhock, hemp
Plum Curculio	Six millimeters in length, dark-colored and has two prominent tubercles on each elytron	Parathion, Guthion	Plum, peach, apple, and other fruits
Potato Aphid	Often winged, pink or green, 1/8 inch long	Diazinon, Parathion, Malathion	Potato, tomato, several other plants
Potato Beetle (Colorado)	Yellow beetle, black striped wing covers	Calcium Arsenate, Sevin, Toxaphene	Potato, tomato, eggplant, tobacco
Rice Weevil	Black snouted beetle, dull reddish-brown, 1/8 inch long	Carbon Bisulfide, Malathion	Cereal grains
San Jose Scale	Scale, circular in shape	Malathion Diazinon	Orchard trees, shrubs, shade trees
Sorghum Midge	Minute orange-colored fly	Carbaryl (Sevin) (80% WP), Diazinon, Carbophenothion (Trithion)	Grain sorghum

Insect	Adult Description	Control	Crops Attacked
Thrips	Minute insects with narrow pointed wings, antennae with 6 to 9 segments	Azinphos-methyl (Guthion) Sevin	Cotton and many others
Bagworms	Adult males are small, dark-colored, heavy-bodied moths with large clear areas in the wings	Malathion, Toxaphene, Carbaryl (Sevin) Lead Arsenate	Evergreens
Pecan Nut Casebearer	Light gray moth, 1/3 inch in length, larva white to pink but later becomes olive-gray to green	Parathion, Malathion, Sevin	Pecans
White Grub	June Bug or May Beetle, heavy, robust, and black in color	Rotation of crops fall plow, Prorate, Birlane	Corn, all grasses, grains, potatoes, and strawberries
Wireworm	Hard-shelled, slender, brown beetle, larva stage, worms are cylindrical and yellowish-brown	Lintox Prophos	Corn, small grains, grasses, potatoes, other root crops
Cotton Fleahopper	Pale green color, 1/8 inch, wings marked with small dark spots and black marks near the end of each	Carbaryl (Sevin)	Cotton

APPLICATION RATES FOR INSECTICIDES

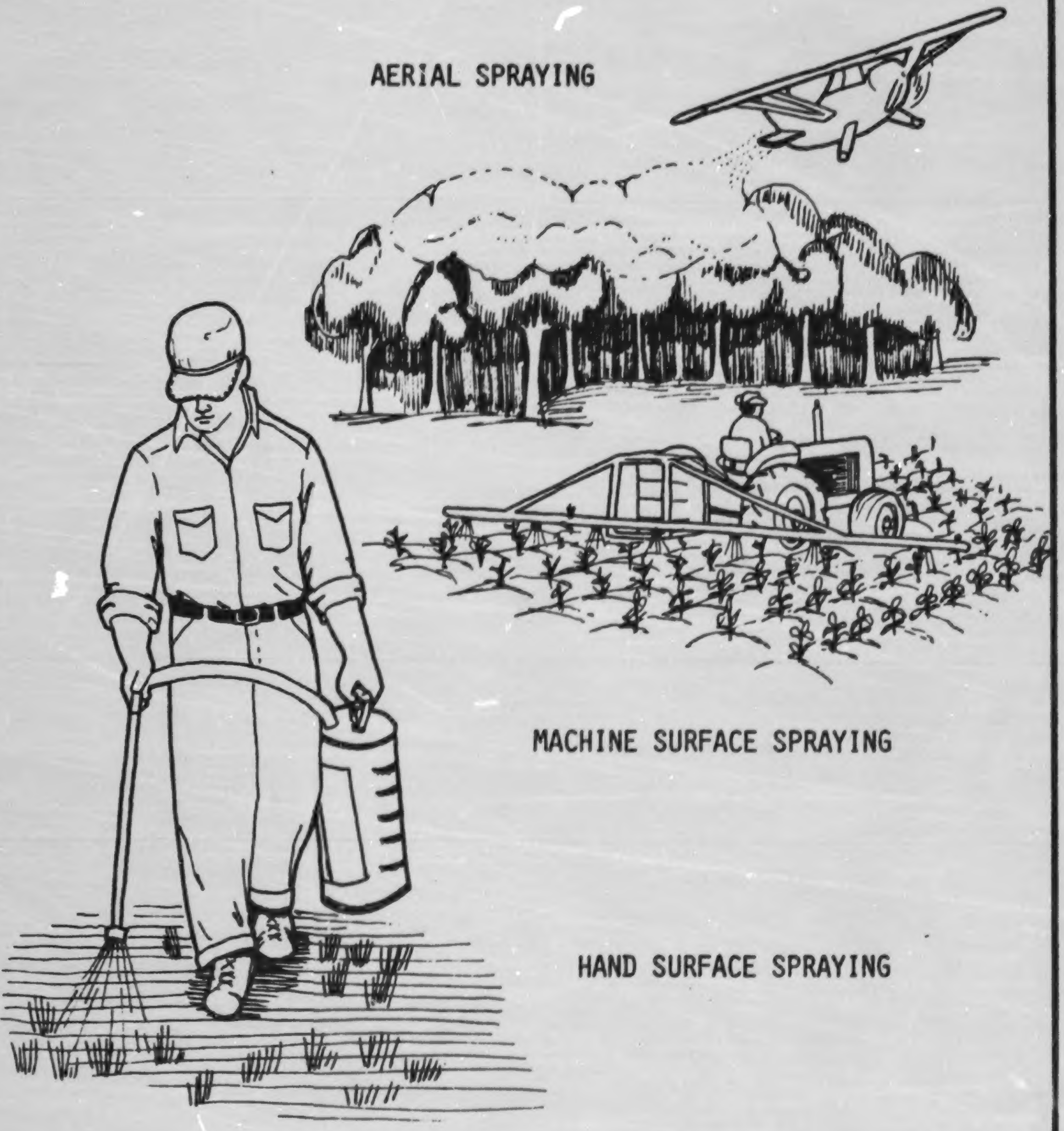
Alfalfa Caterpillar	1 - 4 pounds Toxaphene in 100 gallons of water per acre.
Webworm	Parathion -- 2 to 3 pints concentrate per acre. 1.5 to 1.9 pounds Sevin (80 percent wettable powder) per acre. 1½ to 2 pints Parathion per acre.
Armyworm	½ tp 1½ pounds Sevin in 100 gallons of water per acre. 1 to 4 pounds Toxaphene in 100 gallons of water per acre.
Beanweevil	½ to 2 pounds Rotenone (Derris Powder) per acre.
Chinch Bugs	½ to 2 pounds Malathion in 100 gallons of water per acre.
Corn Earworm	1 to 2 pounds Dibrom per acre. 1.6 pounds Sevin per acre. 1½ to 3 pounds Calcium Arsenate in 100 gallons of water per acre.
Corn Rootworm	Apply Chlordane, Dieldrin, or Aldrin as seed or furrow treatment according to manufacturer's directions. Apply 1 to 1½ ounces to 100 pounds of moistened seed prior to planting.
Cornstalk Borer	4 pounds 14 percent Diazinon, 2 pounds 4 percent G Parathion per acre.
Boll Weevil	1.6 to 2.4 pounds Sevin, 12 to 16 fluid ounces ULV Malathion, ½ to 1 pound Methyl Parathion.
Cotton Boll Worm	2 1/2 to 3 3/4 pounds Sevin plus Methyl Parathion, 1 1/4 to 2 pounds Methyl Parathion, .8 to 1 pound Azodrin per acre.
Cowpea Weevil	1/3 to 2 pounds Rotenone per acre or fumigate with Carbon Tetrachloride - Carbon Disulphide (80 - 20 percent mixture).

Note: This again may change with label from year to year. Cooperative Extension Service will have each year's rules.

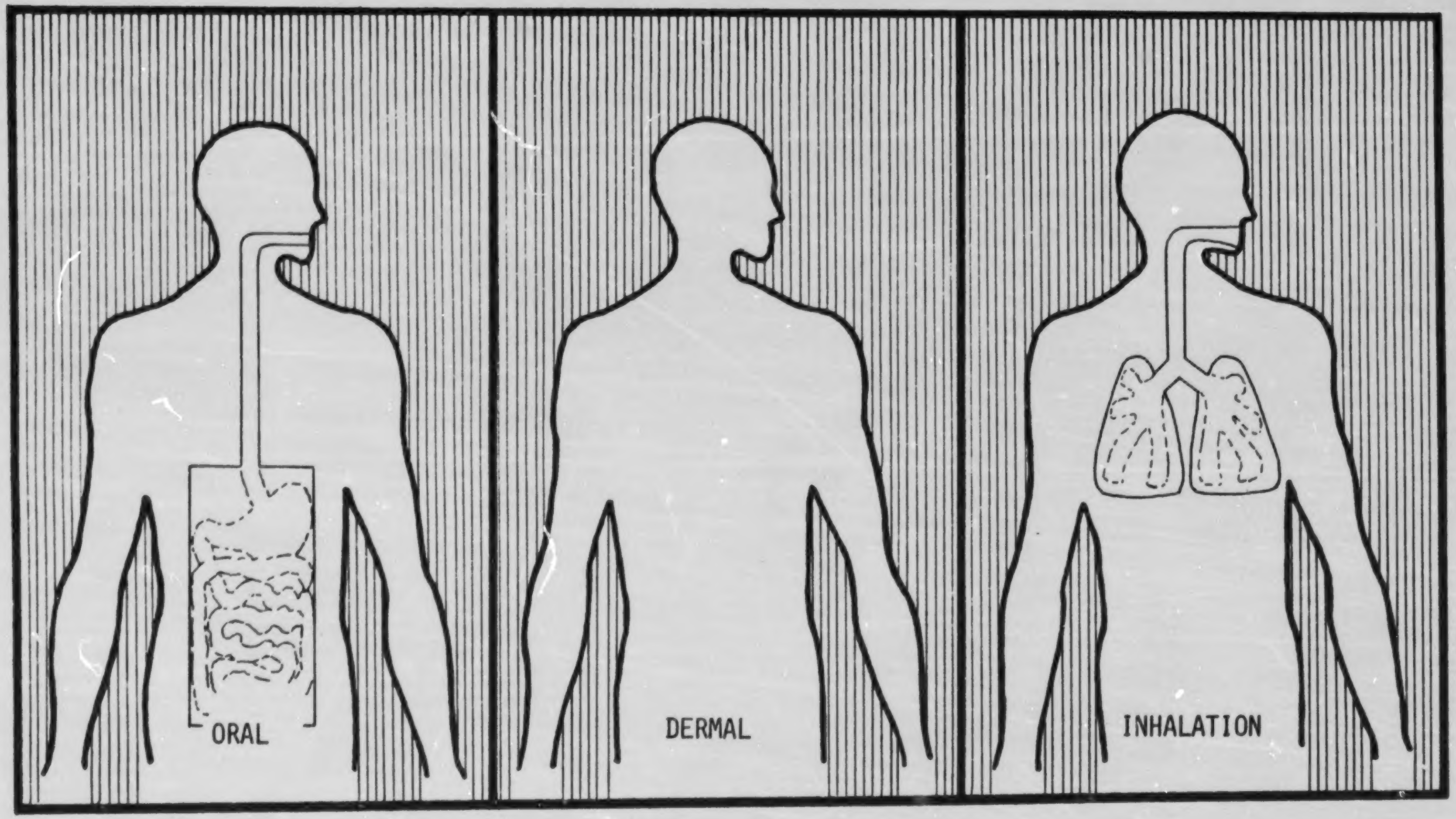
Cutworm	1½ pint Endrin per acre or 2 to 2 1/3 quarts Toxaphene per acre, 1 to 2 pounds Sevin per acre, 1½ to 2 pints Parathion (2 pounds).
Angoumois Grain Moth	1 pint premium grade Malathion, 57 percent emulsifiable liquid, in 2 to 5 gallons of water to each 1,000 bushels of grain. Fumigate with Carbon Tetrachloride - Carbon Disulphide (80 - 20 percent) mixture.
Granary Weevil	Same treatment as for Angoumois moth.
Grasshopper	8 to 16 ounces Sevin, 8 to 12 ounces Diazinon, 12 to 16 ounces Malathion, 16 to 24 ounces Toxaphene per acre.
Greenbug	1½ to 2 pints Malathion, 1½ to 2½ pints Methyl Parathion, 1½ to 2½ pints Parathion, ½ pint Phosphamidon per acre.
Japanese Beetle	Methoxychlor (50 percent wettable powder), 3 pounds per 100 gallons of water; 2 pounds 25 percent wettable powder Malathion in 100 gallons of water, 3 pounds Rotenone, 2 pounds 50 percent wettable powder Sevin.
Lygus Bug	1 to 2 pounds Sevin per acre, ½ pound Methyl Parathion, 1 to 1½ pounds Trichlorofon per acre.
Mites	1 to 1½ pints Ethion (4 pounds), 1 to 2 pints Parathion (2 pounds) per acre.
Pea Weevil	Fumigate with Carbon Tetrachloride - Carbon Disulphide (80 - 20 percent mixture), Carbon Tetrachloride - Carbon Disulphide - Sulphur Dioxide (80 - 15 - 5 mixture), 75 percent Ethylene Dichloride - 25 percent Carbon Tetrachloride.
Pink Boll Worm	3/4 pound Guthion, 2 to 2½ pounds Sevin per acre.
Peach Tree Borer	1½ pound Parathion (25 percent wettable powder) in 100 gallons of water, ½ pound Dieldrin (50 percent wettable powder), 1 pound Guthion (25 percent wettable powder).

Plum Curculio	1¼ pounds Parathion (25 percent wettable powder), 1 pound Guthion (25 percent wettable powder).
Potato Aphid	¼ pound Diazinon, ½ to 1 pound Endosulfan, ¼ pound Parathion, 1¼ pounds Malathion per acre.
Potato Beetle	½ to 1 pound Endosulfan, 1½ pounds Sevin, 3 pounds Toxaphene per acre.
Rice Weevil	1 pint premium grade 50 percent emulsifiable concentrate Malathion in 2 to 5 gallons of water to each 1,000 bushels, fumigate with 80 - 20 percent mixture Carbon Tetrachloride - Carbon Disulphide, 80 - 15 - 5 mixture Carbon Tetrachloride - Carbon Disulphide - Sulphur Dioxide.
San Jose Scale	Recommended dosages of Diazinon, Malathion, or dormant oils.
Sorghum Midge	1¼ to 2½ pounds Sevin (80 percent wettable powder), 1 pint Trithion (4 pounds), ½ pint Diazinon (4 pounds) per acre.
Thrips	.125 pound Guthion, ½ pound Sevin per acre.
Bag Worms	Manufacturer's suggestions for Sevin, Malathion, Toxaphene, or Lead Arsenate.
Pecan Nut Casebearer	2 pounds Endosulfan (50 percent wettable powder), Parathion 2 pounds (15 percent wettable powder), 3 pounds Malathion (25 percent wettable powder), 2 pounds Sevin (80 percent wettable powder).
White Grub	10 pounds Diazinon, ½ to 3 pounds Furadan per acre.
Wireworm	10 pounds Diazinon per acre, 1 - 2 pounds Hexachlor + 100 gallons of water per acre, 1/8 to 3 pounds per acre Furadan in seed furrow.
Cotton Fleahopper	½ to 1 pound Sevin, ¼ - ½ pound Trichlorfan per acre.

METHODS OF SPRAYING FOR INSECT CONTROL

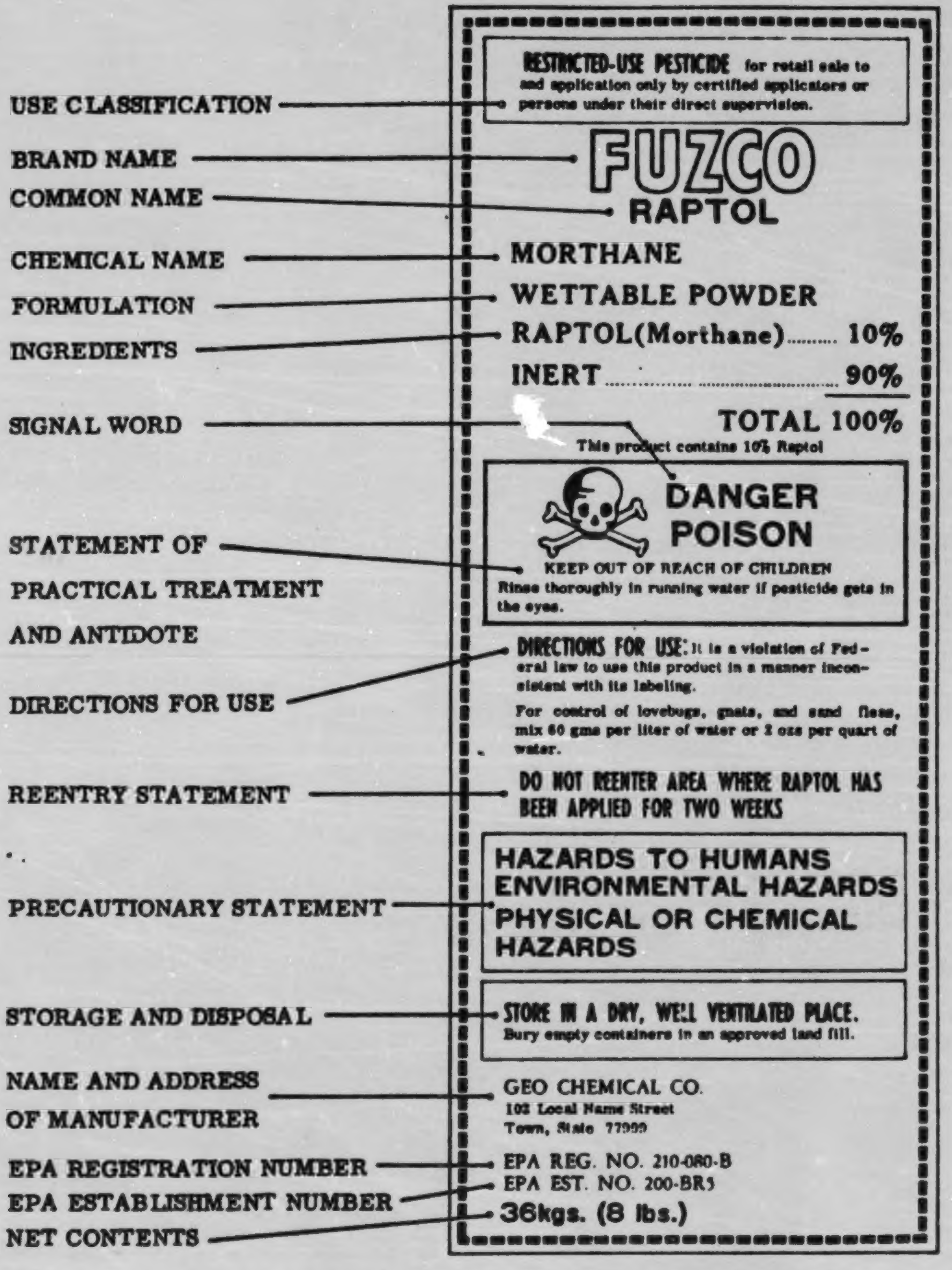

AERIAL SPRAYING
MACHINE SURFACE SPRAYING
HAND SURFACE SPRAYING

Transparency III-2-A


ORAL
DERMAL
INHALATION

EXPOSURE DANGER

Transparency III-2-B


USE CLASSIFICATION
BRAND NAME
COMMON NAME
CHEMICAL NAME
FORMULATION
INGREDIENTS
SIGNAL WORD
STATEMENT OF PRACTICAL TREATMENT AND ANTIDOTE
DIRECTIONS FOR USE
REENTRY STATEMENT
PRECAUTIONARY STATEMENT
STORAGE AND DISPOSAL
NAME AND ADDRESS OF MANUFACTURER
EPA REGISTRATION NUMBER
EPA ESTABLISHMENT NUMBER
NET CONTENTS

RESTRICTED-USE PESTICIDE for retail sale to and application only by certified applicators or persons under their direct supervision.

FUZCO

RAPTOL

MORTHANE

WETTABLE POWDER

RAPTOL(Morthane)	10%
INERT	90%
TOTAL	100%

This product contains 10% Raptol

DANGER
POISON

KEEP OUT OF REACH OF CHILDREN

Rinse thoroughly in running water if pesticide gets in the eyes.

DIRECTIONS FOR USE: It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For control of lovebugs, gnats, and sand fleas, mix 60 gms per liter of water or 2 ozs per quart of water.

DO NOT REENTER AREA WHERE RAPTOL HAS BEEN APPLIED FOR TWO WEEKS

HAZARDS TO HUMANS
ENVIRONMENTAL HAZARDS
PHYSICAL OR CHEMICAL HAZARDS

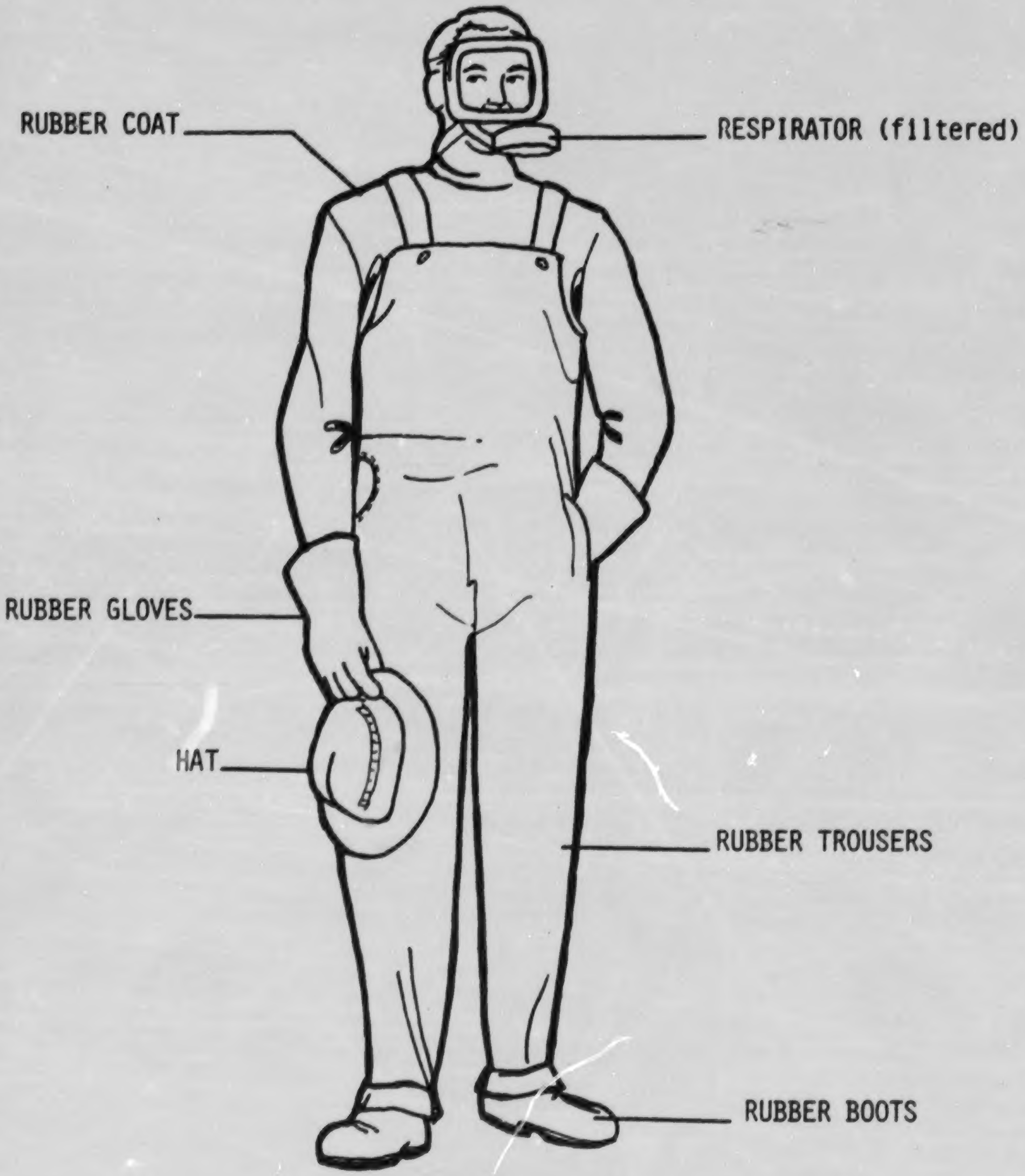
STORE IN A DRY, WELL VENTILATED PLACE.
Bury empty containers in an approved land fill.

GEO CHEMICAL CO.
102 Local Name Street
Town, State 77999

EPA REG. NO. 210-080-B
EPA EST. NO. 200-BR5
36kgs. (8 lbs.)

PESTICIDE CONTAINER LABEL

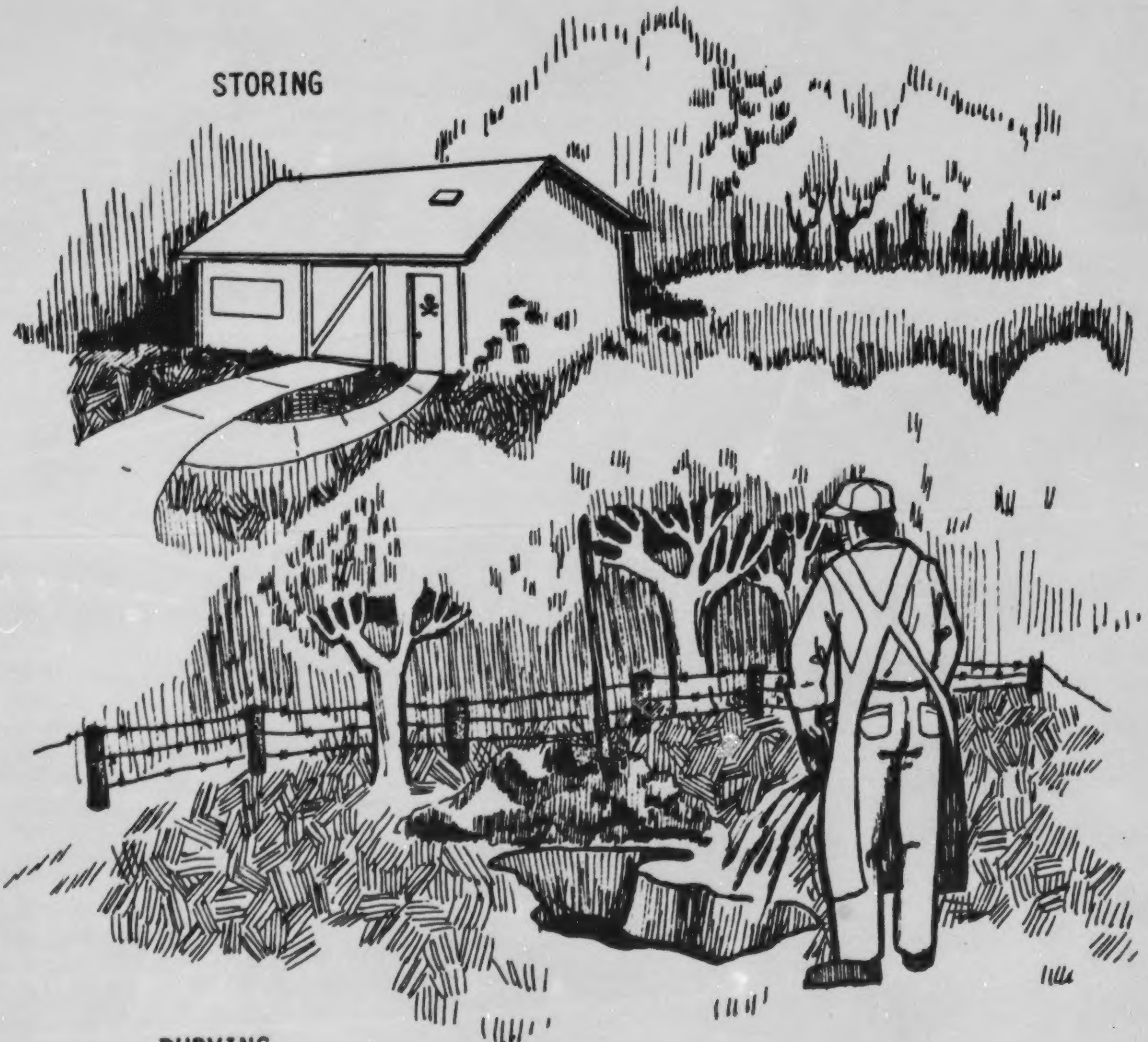
Transparency III-2-C


RUBBER COAT
RESPIRATOR (filtered)
RUBBER GLOVES
HAT
RUBBER TROUSERS
RUBBER BOOTS

WORN FOR MOST PESTICIDES

PROTECTIVE CLOTHING FOR APPLYING PESTICIDES

SAFETY PRACTICES - PESTICIDES


STORING
BURYING

DISPOSING OF PESTICIDE MATERIAL

Transparency III-2-E

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT IV: Seed and Plant Selection

LESSON: Improvement of Plants for Quality Seed Selection

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Explain the importance of seed and plant selection and list the objectives of plant improvement.

2. Specific:

a. Define new terms related to seed and plant selection.
b. Describe the history of crop improvement.
c. List major aims of plant breeders.
d. List and describe three methods of crop improvement.
e. Identify state agency responsible for seed certification in Louisiana.
f. Name major points to consider when selecting varieties for planting.
g.
h.
i.

B. Review Teaching Material

1. Delorit, R.J. and others. Crop Production. 4th. Edition, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1974.

2. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Albany, N.Y., 1979.

C. Special Arrangements

1. Materials

   a. Publications listing recommended varieties for local area of vegetables and crop plants, i.e. "Louisiana Vegetable Planting Guide," "Production Pointers for Commercial Vegetable Growers," etc.

   b. Samples of certified seed

   c. Samples of uncleaned, uncertified seed

2. Travel

   a. Tour seed cleaning and bagging plant

   b. Tour local experiment station to observe plant breeding techniques

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss with students the importance of constant striving for crop improvement in order to meet the food demands of the world.

2. Invite plant breeder from your local Experiment Station to discuss research procedures and possible career opportunities in the field of plant breeding.

3. Invite a USDA seed inspector to speak to class or conduct tour of a seed inspection agency.

4. Display certified seed and uncleaned, uncertified seed to compare differences.

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b. Describe the history of crop improvement.
c. List major aims of plant breeders.
d. List and describe three methods of crop improvement.
e. Identify state agency responsible for seed certification in Louisiana.
f. Name major points to consider when selecting varieties for planting.
g.
h.
i.

B. Review Teaching Material

1. Delorit, R.J. and others. Crop Production. 4th. Edition, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1974.

2. Reiley, H.E. and C.L. Shry, Jr. Introductory Horticulture. Delmar Publishers, Albany, N.Y., 1979.

C. Special Arrangements

1. Materials

    a. Publications listing recommended varieties for local area of vegetables and crop plants, i.e. "Louisiana Vegetable Planting Guide," "Production Pointers for Commercial Vegetable Growers," etc.

    b. Samples of certified seed

    c. Samples of uncleaned, uncertified seed

2. Travel

    a. Tour seed cleaning and bagging plant

    b. Tour local experiment station to observe plant breeding techniques

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss with students the importance of constant striving for crop improvement in order to meet the food demands of the world.

2. Invite plant breeder from your local Experiment Station to discuss research procedures and possible career opportunities in the field of plant breeding.

3. Invite a USDA seed inspector to speak to class or conduct tour of a seed inspection agency.

4. Display certified seed and uncleaned, uncertified seed to compare differences.

B. Content Outline

1. Terms

- a. Heredity -- characteristics passed on from parent to offspring over generations of reproduction of the species
- b. Genetics -- the area of science dealing with heredity
- c. Inbreeding -- self-fertilization of plants to develop individuals which breed true for certain characteristics
- d. Crossing -- produced by interbreeding two pure but different strains or varieties
- e. Progeny -- offspring of animals or plants used especially in connection with controlled breeding
- f. Self-fertilized -- pollinated by pollen from the same plant
- g. Cross-fertilized -- pollinated by pollen from a different plant of the same genus
- h. Mutation -- spontaneous and permanent change in the genetic code
- i. Hybrid -- plant produced from the crossing of two distinct varieties of a species

2. Reasons for Improving Plants

Crop plants have not always been as productive and useful as they are today. Long ago, they grew wild, and selection was accomplished through nature where only the plants that could withstand the environmental conditions survived. Eventually, man discovered that certain plants were more useful to him than others. He learned that if he gathered only the best seeds for planting and used certain cultural practices, he could serve his needs better.

The study of plant genetics was slow in developing but after the groundwork was laid by an Austrian monk, Gregor Mendel, progress occurred more rapidly.

99 The benefits of improved varieties are not limited to farmers alone. They have provided consumers with a greater variety and abundance of higher-quality food, textiles, beverages, and other products for everyday use.

Improved varieties may produce greater yields thus contributing to the food supply during national emergencies and have helped prevent starvation in less fortunate parts of the world.

Plant breeding has helped to make production more efficient which in turn lowers food prices. The development of crops resistant to disease, insects, and unfavorable climate also provides assurance against widespread crop failures.

The aim of the plant breeder is to develop superior varieties by eliminating the undesirable characteristics and combining the desirable ones in the same variety. The desirable characteristics vary with the crop and the conditions under which it is to be grown. In all cases, yield and resistance to major diseases are important. The most important items of concern to the plant breeder are:

a. Resistance to disease, insects, heat, cold, and drought.

b. Proper maturity

c. Good yield

d. Improved quality for animal feed, human food, and industrial use

e. Plant characteristics:

    1) Strength of straw or stalk

    2) Height of plant

    3) Color of grain

    4) Ability to set seed

    5) Shattering of seed

    6) Leafiness

7) Ability to recover following grazing or when to cut for hay. 100

f. Adaptability to various soil conditions

g. Adaptability to harvesting

h. Response to day length

3. Methods of Crop Improvement

Plant improvement is based on the laws of heredity which are included under the science of genetics. In general, the improvement of plants is brought about by three broadly different methods:

a. Introduction
Most of our important crop plants are not native to the U.S. They were brought to this country by our forefathers when they came from other countries or obtained from other lands by the U.S. Dept. of Agriculture. Some of these varieties are grown commercially, but most of them are used to provide breeding material for use in the development of new or improved varieties.

b. Selection
This method consists of selecting the outstanding types and discarding those that are undesirable because of certain characteristics. After a period of testing, during which plants are selected for certain desired traits or characteristics, a superior strain may be developed. Improvement by selection cannot be accomplished, unless the variety from which the selections are being made possesses plant traits that contain the desired characteristics.

Selection is also used along with other procedures, such as inbreeding and crossing, in developing new varieties. Two procedures are commonly used when new varieties are developed by the process of selection:

1) Mass Selection -- This method consists of selecting a fairly large number of individual plants

that possess the desired characteristics. The seed from such plants is then bulked and sown together, and the better individuals are again selected and the poorer ones discarded. The process is repeated for a few years until the plants are reasonably uniform in desired qualities.

2) Individual Plant Selection -- Often referred to as pedigree or pure-line selection, this method uses individual plants that are selected for superior characteristics. Instead of mixing or bulking the seed, the seed from each individual is planted in a separate row. The offspring of each plant is then carefully observed and a record is made of their appearance and performance. Comparisons between the different progenies are made and those with undesirable characteristics are discarded. This method can be used with both self-fertilized and naturally cross-fertilized plants. After selection and testing for a number of years, if the strain proves to be superior to the standard varieties and no mutations occur, it is grown in larger plots to increase the supply of seed. It usually takes seven to ten years before a new variety can be released to farmers.

c. Hybridization

Hybridization refers to the crossing of two or more races, varieties, or species that differ in one or more inherited characteristics. The offspring of such a cross is referred to as a hybrid. By crossing or hybridizing two or more strains or varieties, there is an opportunity for the breeder to combine the good characteristics of each plant in the hybrid and produce individuals that differ markedly from the parent plants.

4. Distribution and Maintenance of Varieties

Crop improvement is useless unless the new varieties can be maintained in their pure condition and made available to farmers at a reasonable price. Farmers must be assured that they actually receive the variety and quality of seed they purchase. Consequently, sources of dependable, high-quality seed must be available and maintained. This is accomplished in most states by agricultural experiment stations, crop-improvement associations, and commercial crop-improvement associations.

The Louisiana State Deparment of Agriculture is responsible for the seed certification program. Certified seed is defined as seed that has been handled so as to maintain satisfactory genetic identity and purity and that has been approved and certified by the USDA (US Dept. of Agriculture).

5. Selecting Varieties

One of the most important steps in preparation of planting a crop is selecting the proper variety. The Cooperative Extension Service publishes recommended varieties for Louisiana in several publications including "Louisiana Vegetable Planting Guide," "Production Pointers for Commercial Vegetable Growers," and others.

It pays to purchase seed from a reputable professional and not to depend on home supplies. Home-grown seed may carry diseases or may not be true to the variety due to cross-pollination. The cost of seed is very low compared to the total cost of producing vegetables; it pays to start with the best.

Disease resistant varieties should be used whenever a disease is known to be a problem in the area. This is especially true for nematode and virus disease control.

103 Hybrid varieties are generally more vigorous and give higher yields for the same effort and cost.

Hybrids should be used whenever possible.

Fresh seed should always be used. Always buy seeds that are dated for planting that year. Seed should be stored in a dry, cool, dark place such as a refrigerator.

C. Student Activities

1. Using publications listing recommended varieties for local area, have students list the best varieties of 10 vegetables or crops for planting including one disease-resistant variety for each.

2. Organize tour of seed cleaning facility if available in area.

3. Organize tour of local experiment station to observe plant breeding techniques.

4. Visit local retail seed store.

5. Make seed collections.

6. Seed germination test: 100 seeds planted in peat pots or trays and calculate percentage of germination.

D. Suggested Study Questions

1. Define the terms found in the lesson.

2. Give a brief history of crop plant improvement.

3. List items of concern to the plant breeder.

4. List breeding characteristics of a plant.

5. What is the basis of crop plant improvement?

6. Name and describe the three methods of selection for crop plant improvement.

7. Name the three agencies responsible for seed certification in Louisiana.

8. List the major points to consider when selecting varieties. 104

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT V: Diseases Affecting Plants

LESSON 1: Types of Plant Diseases; their transmission, and how they affect plants

I. Preparation for Instruction

A. Student Objectives

1. Terminal: List the major causes and symptoms of plant diseases and how they are transmitted.

2. Specific:

a. Define new terms related to diseases affecting plants.
b. Name five major causes of plant diseases.
c. Recognize and describe the symptoms and effects of major diseases on plants.
d. Name several methods by which diseases are transmitted in plants.
e.

f.

g.

B. Review Teaching Material

1. A Basic Program in Plant Science, La. State Dept. of Education and LSU School of Vocational Education, 1969. Unit IV.

2. Ahlgren, H.L., R.J. Delorit, L.J. Greub. Crop Production. 4th. edition, Prentice Hall, Inc., Englewood Cliffs, N.J., 1974. Chapter 2.

C. Special Arrangements

1. Materials

a. Specimens of plant diseases (slides, pictures, filmstrips, or specimens)

b. Healthy plant and diseased plant of same species

2. Travel

Field trip to collect diseased plant specimens

3. Audio-visual equipment

Overhead projector/transparencies

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Compare healthy plant to diseased plant in a class display.

2. Discuss losses farmers incur because of plant diseases (1975 estimate was 10 billion dollars annually).

3. Examine or display plant disease pictures that can be obtained from agriculture chemical distributors, local farmers, cooperatives, or Cooperative Extension Service.

4. List on chalk board students' ideas about how they think plant diseases spread.

B. Content Outline

1. Terms

   a. Microorganism -- extremely small organism that can be viewed only with the aid of a microscope.

   b. Pathogens -- disease-causing organism.

   c. Symptoms -- warnings of plant growth problems.

   d. Day-length -- number of light hours in a 24-hour day.

   e. Wilt -- loss of freshness and drooping of plants.

   f. Mosaic -- symptom of a virus disease appearing as dark green, light green, white, or yellowish irregular spots on the leaves.

   g. Blight -- rapid discoloration and death of tissue over certain portions of the plant.

   h. Curl -- puff like distortion on a leaf resulting from the unequal development of its two sides.

   i. Dwarfing -- failure of any plant part to develop properly.

   j. Gall -- a localized swelling on roots, stems, or branches.

   k. Mildew -- disease caused by fungi which forms whitish or graying coating on the surface of the leaves.

   l. Rot -- state of decomposition.

   m. Smut -- disease caused by fungi which forms black coating on surface of the leaves.

   n. Disease -- a condition of a plant part that hinders normal functions.

2. Symptoms of Plant Diseases

When a plant is suffering from a disease, the plant is being attacked by microorganisms called pathogens. The visible effects of pathogens are called symptoms. For disease to occur it is necessary to have:

a. The presence of a pathogen (germ).

b. A susceptible host plant.

c. Temperature and moisture conditions favorable for the pathogen to invade and become established in the host plant.

Pathogens damage a plant by destroying one or more of the following:

a. Leaf tissue

b. Vascular tissue

c. Root system

d. Reproductive organs

Each pathogen may display different symptoms. Some of the same symptoms may occur for different diseases. General disease symptoms include:

a. Yellowing of leaves

b. Brown, tan, or dark colored dead spots on the leaves or stem (leaf spots).

c. Formation of a reddish or dark-colored dustlike material on the leaves or stem (rust).

d. Wilting or yellowing of plant parts followed by their death (wilts).

e. Black, soft spots in the tissue of various plant parts, especially roots, crowns, stems, or food-storage organs (rots).

f. The presence of whitish, pinkish, or grayish mold (mildews).

g. Reduction in the growth rate and size of the plant.

h. Abnormal growth such as stunting or formation of odd-shaped plant parts.

3. Major Causes of Plant Disease

There are five types of pathogens that cause disease in plants:

a. Bacteria

Bacteria are very small one-celled microorganisms. They are non-green which means they depend on plants and animals for their food. When examined under a microscope, the bacterial shape can help determine the exact disease affecting the plant. There are three main types of bacteria:

1) Cocci -- round

2) Spirilla -- spiral-shaped

3) Bacilla -- rod-shaped

Bacteria can gain access to a plant through breathing pores (stomata), wounds, and insects, or be carried inside the seed.

Symptoms of bacterial infections include galls, blight, rots, retarded maturity, and bacterial wilts.

Some examples of diseases caused by bacteria are bacterial blight on soybeans, cotton, and other crops, and bacterial wilt in alfalfa and corn. (Transparencies V-1-A&B)

b. Fungi

All fungi are not harmful but they cause many plant diseases. (Transparency V-1-C)

Fungi reproduce by the formation of microscopic bodies called spores. These spores move from place to place by wind, water, insects, seeds, birds, and many plant parts. When the spores germinate in a favorable environment, they produce a thread-like strand which begins to grow and feed on plant tissues. The most favorable environment for fungi growth is high temperature and high humidity.

Fungi are found in the form of mildews, molds, smut, and mushrooms.

Some examples of diseases caused by fungi are: (Transparencies V-1-E&F)

1) Fusarium wilt -- usually grows inside the plant and may occur on cotton, tomatoes, and watermelons.

2) Powdery mildew -- usually located on the underside of leaves on non-legumes, watermelons, grapes, and roses.

3) Anthracnoses -- occurs inside and outside the plant and affects beans, cowpeas, and cucurbits.

4) Leaf spot -- affects fruit trees.

5) Downy mildew -- occurs both inside and outside of plant and usually affects grain, grass, and some cucurbits.

6) Rust -- occurs either inside or on the surface of the plant and affects grains and grasses. (Transparencies V-1-C&D)

c. Viruses

Viruses are non-living, disease-producing agents so small that only an electron microscope makes them visible. They occur inside the plant and are difficult to study. (Transparency V-1-G)

Viruses may enter a plant by mechanical means, insect injury, or vegetative propagation. Plant viruses can be transmitted by insects, nematodes, soil, and seed.

Virus diseases produce a wide range of symptoms and types of injury to plants. Some may kill the plant in a short time while others cause lesser injuries that result in reduced yields and lower quality products.

Viruses that cause plant diseases are grouped together into two groups:

1) Mosaics -- cause molting, spotting, loss of color of plant tissue, and a general mosaic appearance. Usually affects potatoes, tomatoes, and raspberries.

2) Yellows -- cause a yellowing of plant parts, dwarfing, curling of leaves, gall formation, and immaturity of plant parts.

Curly top is an example of a virus affecting a tomato plant.

d. Nematodes

Nematodes are round worms that live in soil or water. They attack plant roots by inserting a tiny, spear-like mechanism and draw out the plant's juices. They injure the roots and thus permit the invasion of fungi and bacteria.

A plant affected by nematodes will show symptoms such as unhealthy foliage, pale color, dwarfing, wilting, and even death. Root-knot nematodes cause an abnormal enlargement of root cells or galls to form where they feed. (Transparency V-1-H)

e. Environment

There are several environmental factors that affect plant growth. The most important factor is probably nutrition. When a plant does not get all of the nutrients, water, or sunlight needed, it is said to have a nutritional deficiency.

Nutritional deficiencies may appear in many forms:

1) Nitrogen deficiency is usually characterized by a meager growth and yellowish-green foilage coloring. Yellowing begins with the older leaves and progresses upward.

2) Phosphorus deficiency appears as small or stunted growth and purpling of the leaves and stems.

3) Potassium deficiency is characterized by yellowing of the leaves from the margins toward the center of the leaf.

Other environmental factors that may affect plants are:

1) Air supply in soil around roots
2) Water supply
3) Temperature ranges
4) Day-length, which influences growth, germination, flowering, and seed bearing
5) Man, who supplies an artificial environment
6) Competition with other plants and animals

C. Student Activities

1. Have students collect specimens of diseased plants. Specimens should be pressed, mounted, and labeled for future identification.
2. Have students collect and compare plants damaged by environmental factors with those damaged by disease.

D. Suggested Study Questions

1. Define the terms found in the lesson.
2. What conditions are necessary for disease to occur in crop plants?
3. How do pathogens damage plants?
4. List several plant disease symptoms.
5. List the five types of pathogen that cause disease in crop plants.
6. Classify bacteria according to shape.

7. Give examples of diseases caused by fungi in crop plants.

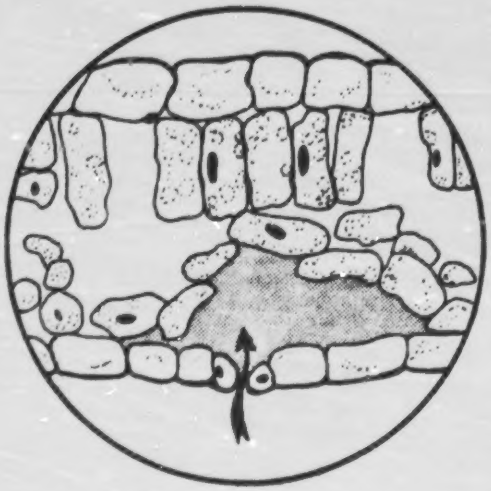
8. List two groups of viruses that cause crop plant disease.

9. List the symptoms of a plant affected by nematodes.

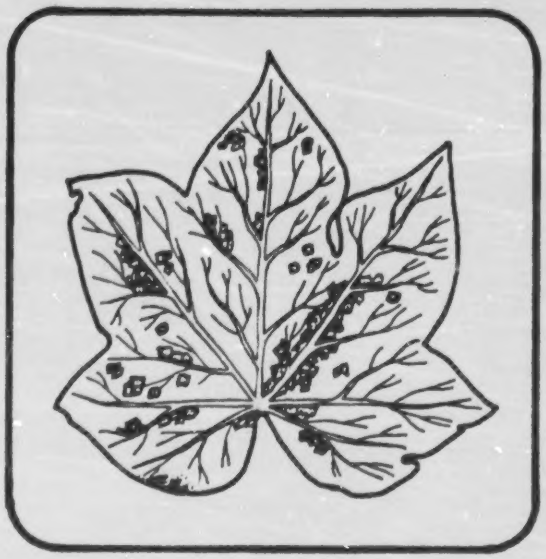
10. Name the symptoms of nutritional deficiences of N-P-K in a crop plant.

11. List environmental factors that affect crop plants.

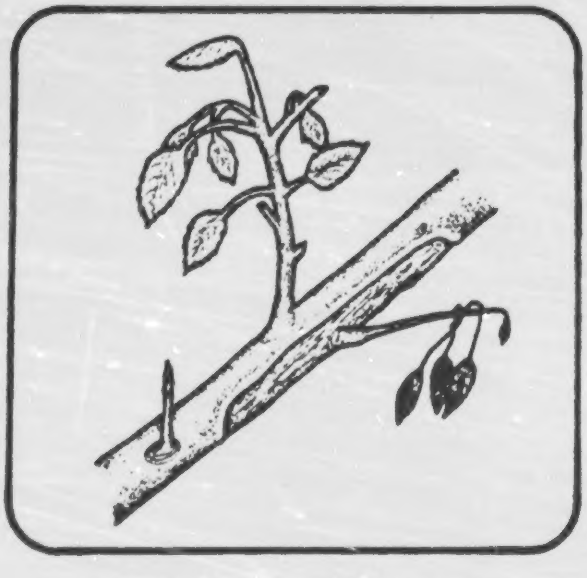
BACTERIAL DISEASES



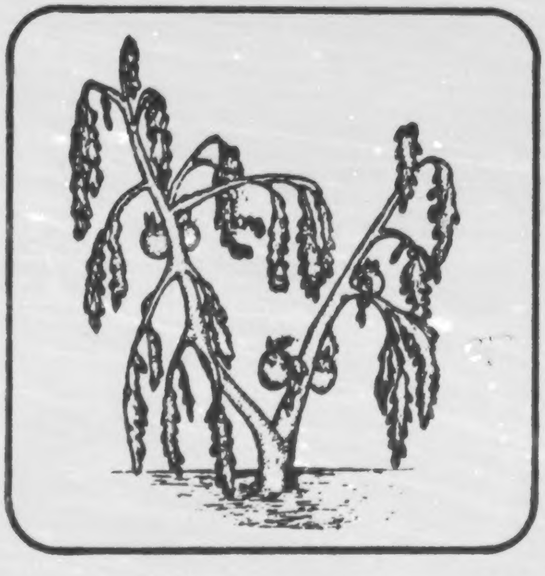
BACTERIA ENTERING
THROUGH A STOMATA
OF LEAF SECTION



ANGULAR LEAF SPOT OR
BACTERIAL BLIGHT IN COTTON



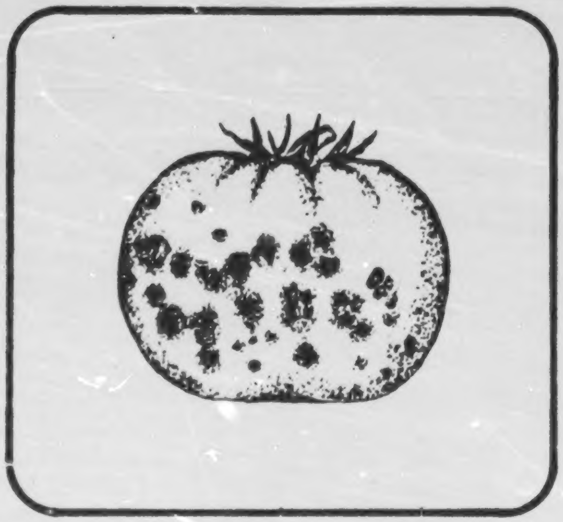
CANKER - BACTERIAL
DISEASE OF FRUIT TREES



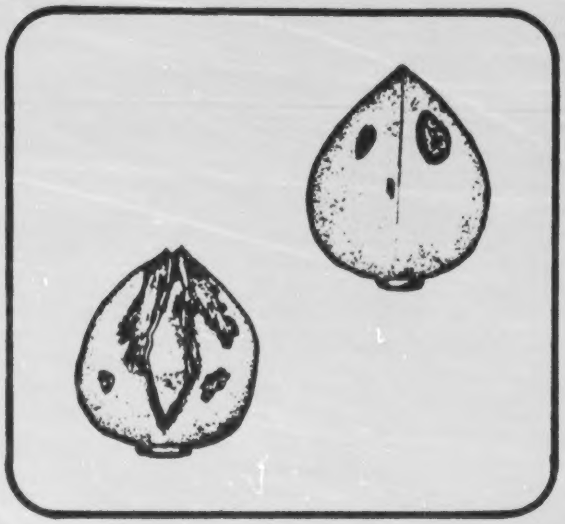
BACTERIAL WILT -
TOMATO PLANT

Transparency V-1-A

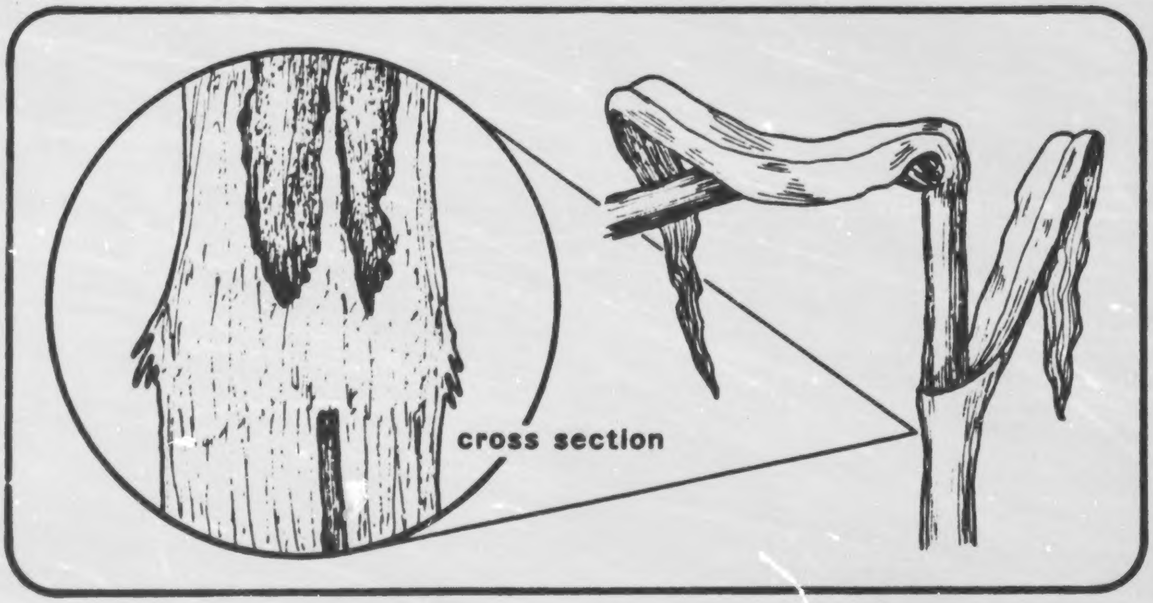
BACTERIAL DISEASES



BACTERIAL SPOT
ON TOMATO



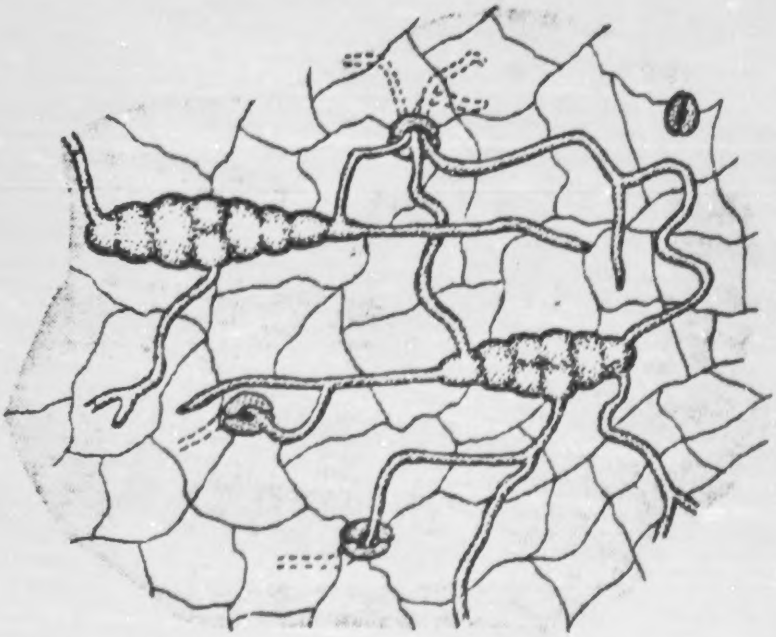
BACTERIAL BLIGHT
ON COTTON BOLLS



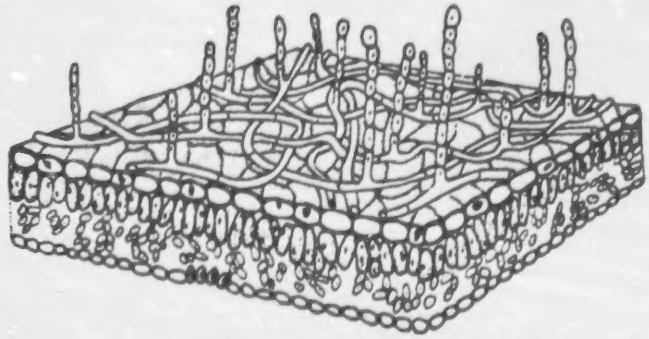
STALK ROT DISEASE IN CORN PLANT

Transparency V-1-B

FUNGI



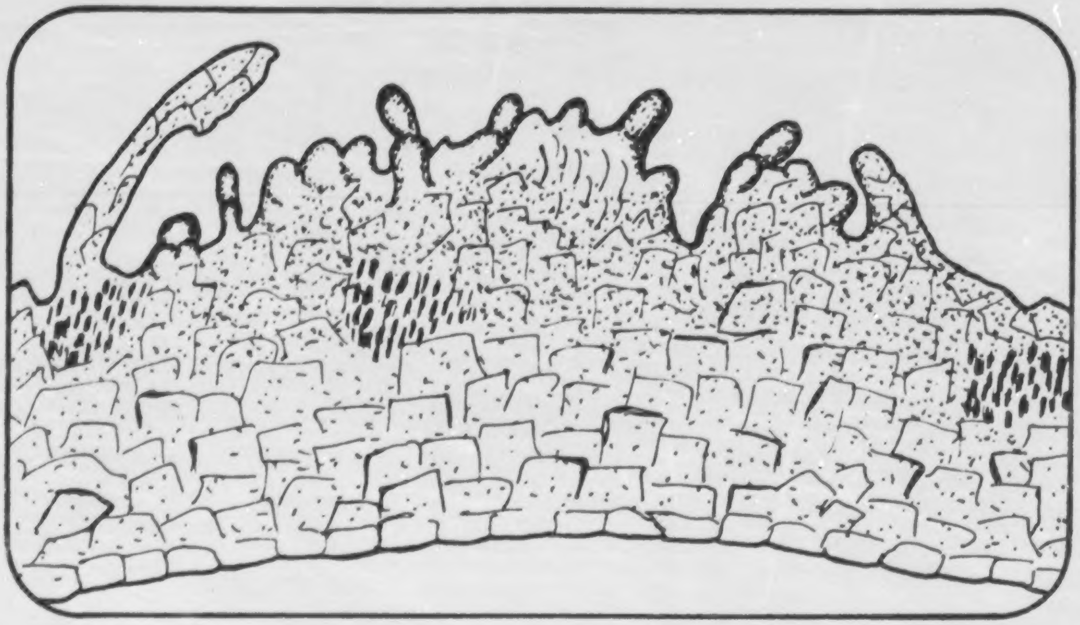
GERMINATING SPORE STRANDS ENTERING LEAF STOMATA



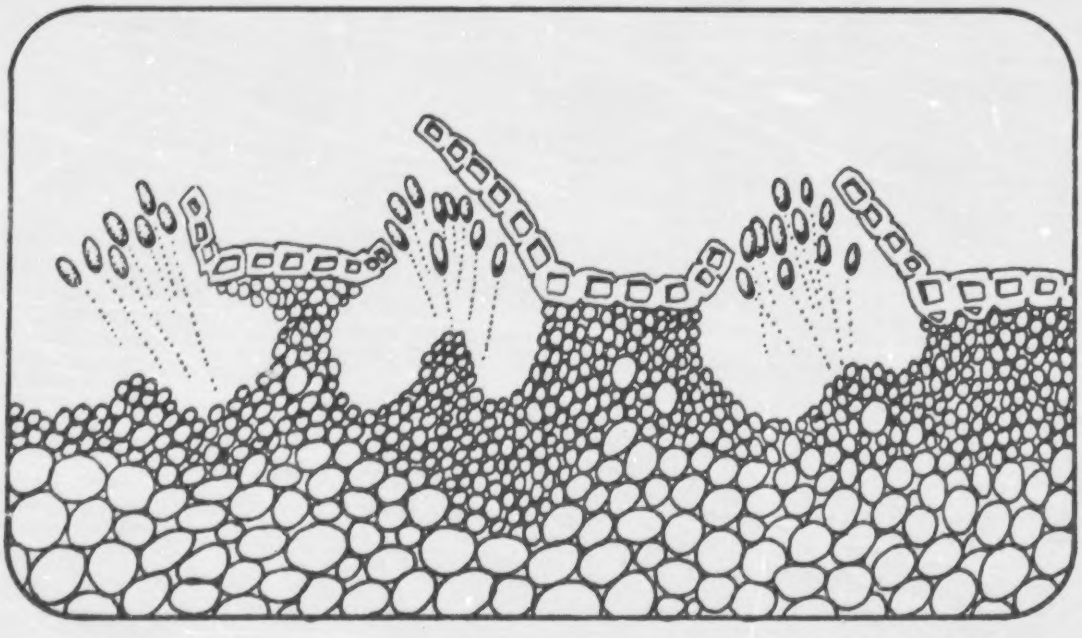
SPORE FORMATION ON LEAF - POWDERY MILDEW

Transparency V-1-C

FUNGI



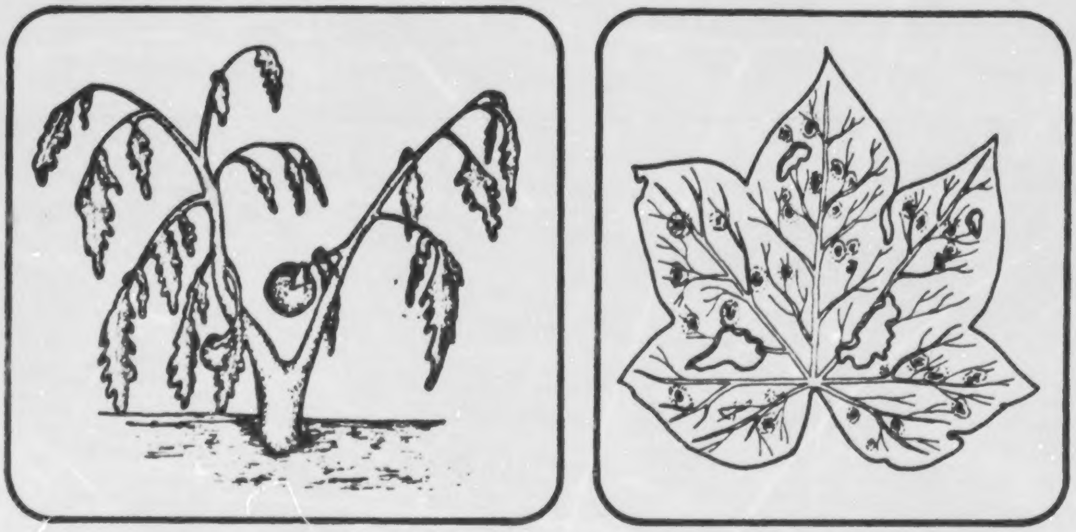
PUSTULES RUPTURING TO FREE SPORES



RUST PUSTULES ON LEAF OF SMALL GRAIN

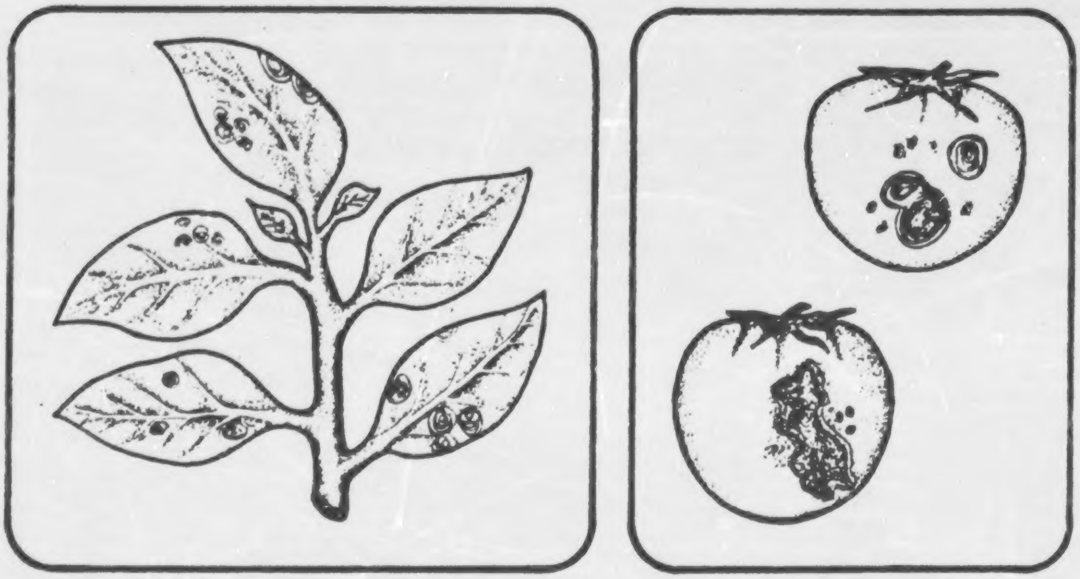
Transparency V-1-D

FUNGI



WILT - CAUSED BY FUNGI ENTERING ROOT AND STEM

RUST ON COTTON

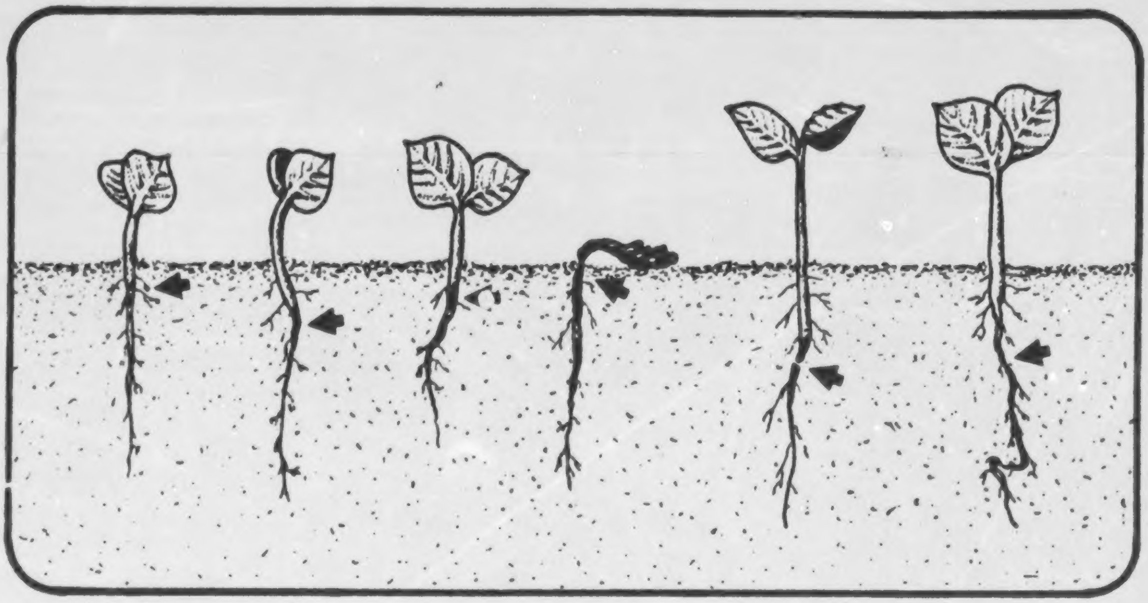


LEAF SPOT - OR EARLY BLIGHT

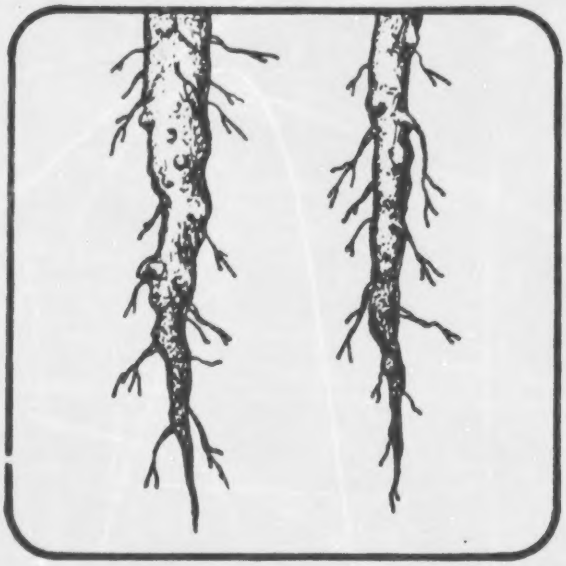
SOIL ROT IN WET SOIL

Transparency V-1-E

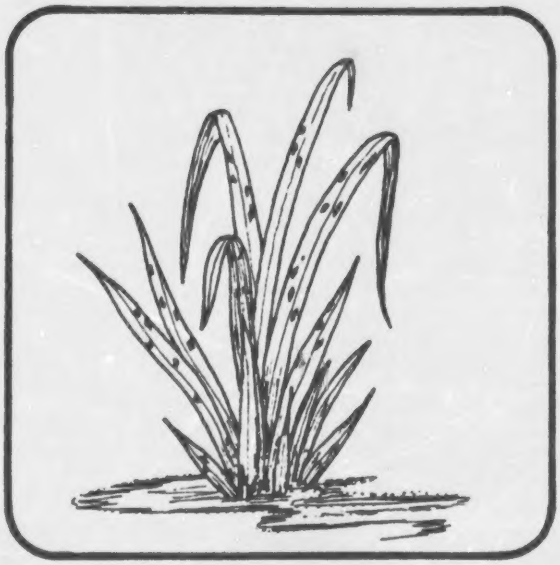
FUNGI



YOUNG PLANT ROOTS DESTROYED BY FUNGI



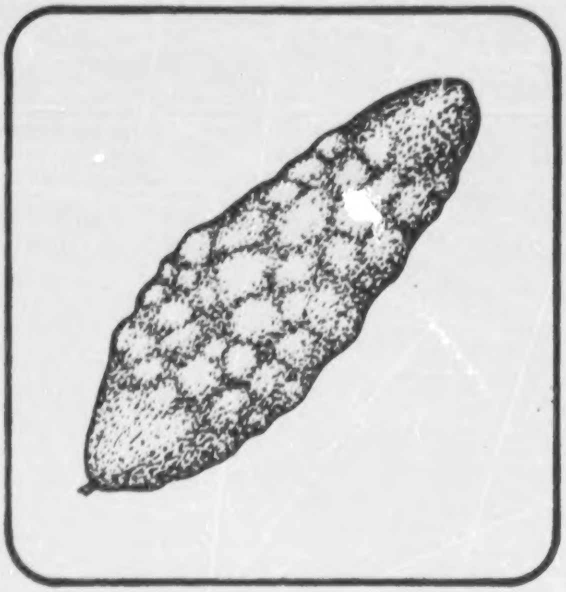
COTTON ROOT ROT



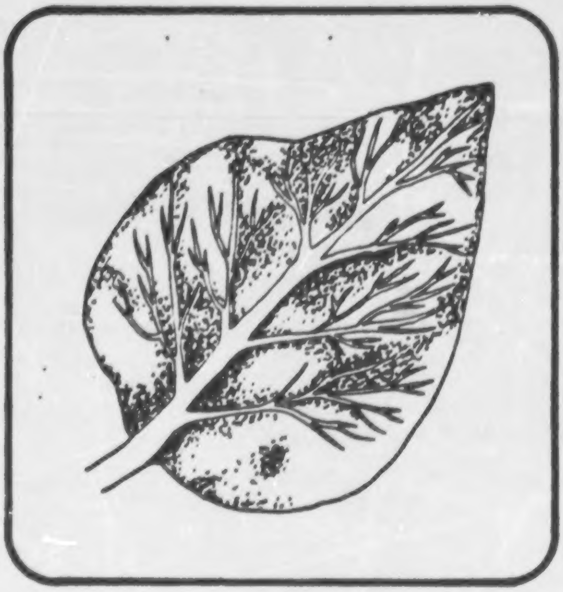
RUST FUNGUS ON GRASS

Transparency V-1-F

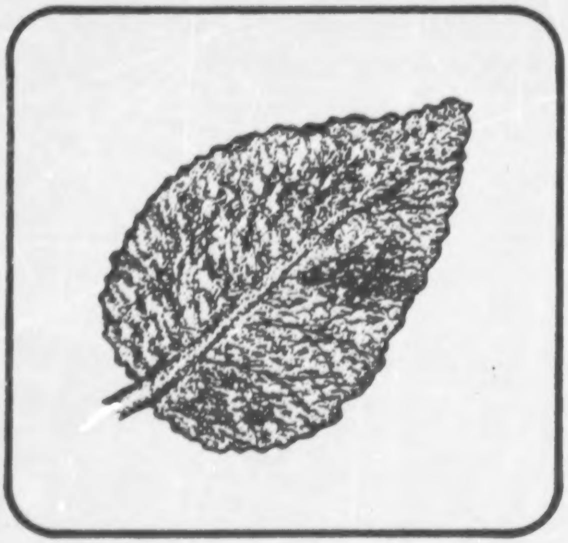
VIRUSES



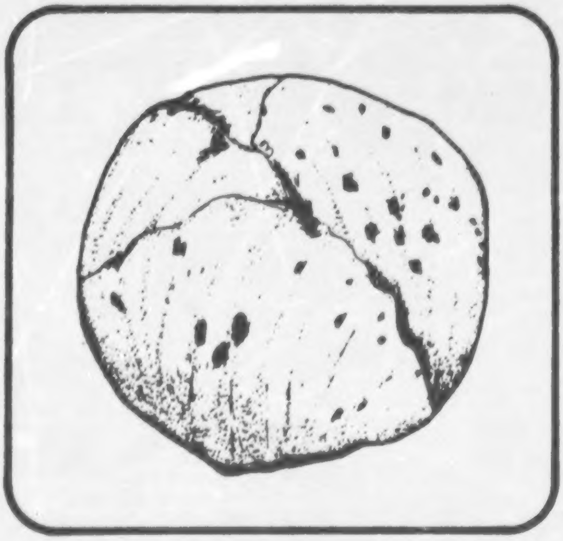
CUCUMBER WITH DARK GREEN WARTS - MOSAIC VIRUS



DARK GREEN MOTTLING DUE TO MOSAIC VIRUS



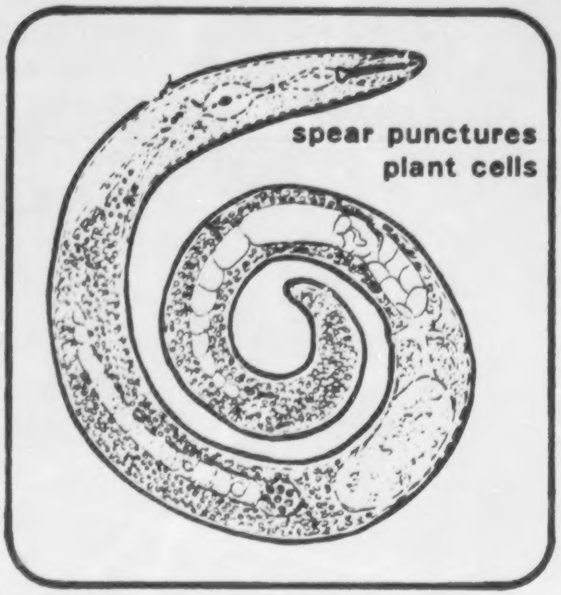
LEAF WRINKLED DUE TO VIRUS



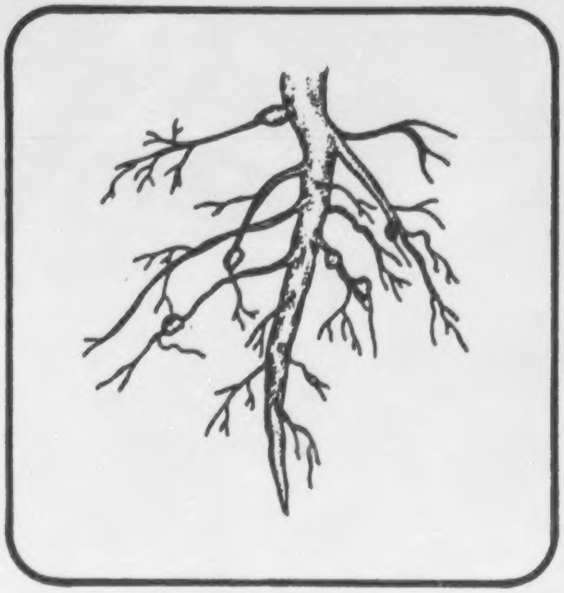
MOSAIC VIRUS ON CABBAGE

Transparency V-1-G

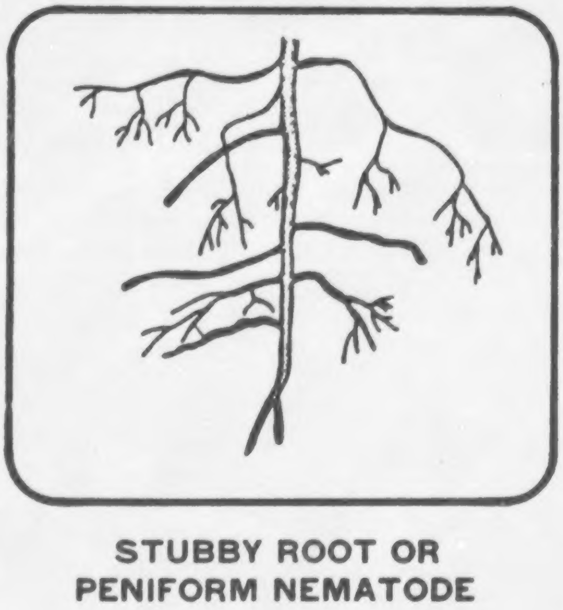
NEMATODES


spear punctures
plant cells

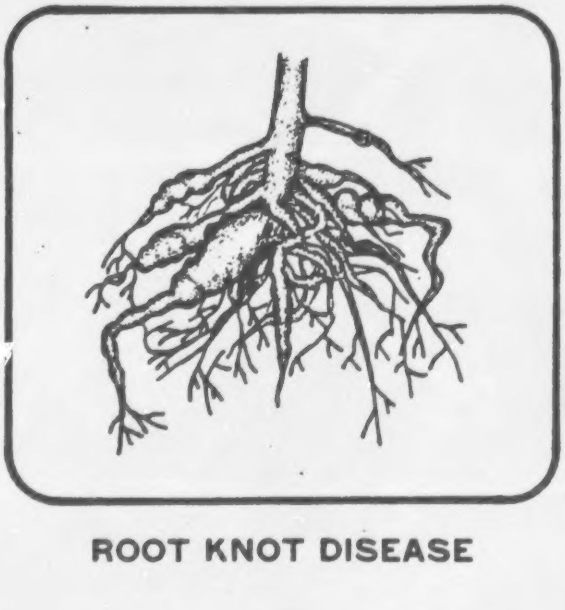
NEMATODE
(size less than 2.0 mm)



GALLS OR KNOTS ON ROOTS



STUBBY ROOT OR
PENIFORM NEMATODE



ROOT KNOT DISEASE

Transparency V-1-H

INSTRUCTIONAL AREA: Plant Science

INSTRUCTIONAL UNIT V: Diseases Affecting Plants

LESSON 2: Control of Plant Diseases

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify the methods used to control plant diseases.

2. Specific:

a. Define terms related to control of plant diseases.
b. List and describe cultural practices that may be used to prevent plant diseases.
c. List methods of disease control with chemicals.
d.

e.

f.

B. Review Teaching Material

1. A Basic Program in Plant Science, La. State Dept. of Educ. and LSU School of Vocational Educ., 1969, pp. 146-153.

2. Ahlgren, H.L., R.J. Delorit, and L.J. Greub. Crop Production. 4th. Edition, Prentice-Hall, Inc., Englewood Cliffs, N.H., 1974, pp. 66-73.

C. Special Arrangements

1. Materials

Chemical packages containing materials for the control of plant disease

2. Travel

   Student trips to garden project

3. Audio-visual equipment

   Overhead projector/transparencies (optional)

II. Presentation of Lesson and Suggested Student Activities

   A. Motivation

      1. Display chemicals used in disease control of plants.
      2. Discuss students views on chemical control of plant diseases and their reasons for being for or against chemical control.
      3. Discuss reasons for government regulations in transporting produce.

B. Content Outline

1. Terms

a. Damping-off -- a disease of seedling plants usually caused by fungi.

b. Fumigant -- a liquid or solid substance that forms vapor which destroys pathogens and insects.

c. Fungicide -- a chemical that kills or inhibits fungi.

d. Resistance -- the inherited ability of a plant to retard growth of disease organisms.

e. Sprays -- prepared mixture of emulsified concentrates which are sold in different percentages.

f. Dust -- a powder ready to apply to plants for disease control.

g. Volatile -- any substance that will evaporate into the air.

h. Crop rotation -- alternating crops in the same field plot.

i. Sanitation -- destroying all infested and infected plant parts during the season.

2. Disease Control by Prevention

Prevention of a disease is much better than trying to cure one. Control methods and sanitation should be initiated before diseases become apparent.

a. Use of Resistant Varieties

Plant breeders have developed varieties that are resistant to those diseases that commonly affect them.

Once a resistant variety is developed, there is no guarantee that it will remain resistant. Most pathogens are able to undergo sexual reproduction, thereby producing pathogens with a different genetic make-up that may attack new varieties.

Developing resistant varieties is one of the most economical ways to control disease; if chemicals become necessary there is the possibility of damage to the plant or seed.

b. Use of Disease-Free Seed

Treated and untreated seed may be free of disease, but those seeds that are treated and certified will be less likely to be infected with disease.

c. Seed Treatment

Fungicides applied to seed may be formulated as dusts, wettable powders, solutions, or suspensions. There are two general types of treatment:

1) Eradicative seed treatment which destroys disease-causing fungi and bacteria within the seed.

2) Protective seed treatment which applies a coating to the surface of the seed protecting it from rot and damping-off diseases.

d. Soil Treatment

The purpose of soil treatment is to kill or control disease-inducing organisms. Soils can be sterilized or fumigated using heat or chemicals.

1) Fumigation involves using volatile chemicals in order to kill organisms in the soil. This is desirable to use on a small scale. For best results, the soil should be 55°F or above, and the moisture content should be sufficient to be in a good state of tilth and should be relatively free of non-decomposed organic matter.

2) Steam treatment sterilizes the soil. The temperature should be maintained at 180°F throughout the soil for 30 minutes.

3) Dry heat may be used to sterilize soil in small containers such as flower pots. The treatment involves placing soil in an oven set at 160°F for three hours or more depending on the amount of soil to be sterilized.

4) Drench with soil fungicides may be applied to the soil around the growing plant in the form of a liquid drench.

5) Granules -- Used much like a drench, granules are incorporated into the soil.

e. Quarantine

The separation of the pathogen and the plant may be accomplished by legal methods. Quarantines are maintained by the USDA and prohibit the importation of certain plants. They may effectively eliminate or at least slow down the introduction of new diseases. Subjecting plant shipments to inspection will also help prevent disease spread.

f. Crop Rotation and Field Sanitation

Crop rotation is often an important control measure for plant disease. By using this method of control, the soil-borne organisms will have a period in which to die out before another susceptible crop is replanted. Soil-borne pathogens may remain in the soil from one to ten years.

g. Use of Proper and Balanced Fertilizers

Vigorous, healthy plants are not attacked by certain pathogenic organisms.

h. Other cultural practices that may help to prevent disease infestation and spread in crops are:

1) When practical, eliminate flow of drainage and irrigation water from one field to another. Pathogenic

bacteria and fungi can be spread from one plant to another by rain, wind, running water, and even dew.

2) Avoid using manure from animals that have eaten vegetation from diseased fields.

3) Destroy diseased plants including weeds by burning or burying. This procedure is ineffective for mosaic viruses.

4) Prune and destroy diseased plant parts of shrubs and trees. Clean pruning equipment after use and use a wound dressing to prevent reinfestation.

5) Use all protective measures to prevent carrying organisms from one locality to another.

6) Turn under crop residues so that plant material will decay prior to the next crop growing season.

7) Stocks and scions should be free of plant diseases.

3. Disease Control by Chemicals

To be economically feasible, chemical control of diseases must give additional benefits after the cost of the control is subtracted. In other words, chemicals are so expensive that it must be substantially beneficial to use them.

Chemical controls for plant diseases may be obtained in two forms.

a. Dusts

Dusts are commonly used by home gardeners because they require no special application equipment although some equipment is available. Usually best results occur if dusts are applied before any evidence of plant damage is visible.

b. Sprays

Sprays are very effective because they stick to the plant surfaces better than dusts. Sprays require special equipment for application such as a compressed-air sprayer.

C. Student Activities

1. Have students add methods of control to the labels on their specimens of plant diseases that were collected earlier.
2. Invite a USDA Inspector to speak to the class about plant laws and careers associated with plant inspection.
3. Have students collect and identify diseased plants and recommend control and treatments.

D. Suggested Study Questions

1. Define the terms found in the lesson.
2. Which is more economical -- prevention or cure of plant diseases?
3. What is the most economical way to control plant diseases?
4. What are the two general types of fungicide treatment of seed?
5. State the purpose of soil treatment.
6. List the methods of sterilizing the soil.
7. What is a legal method of controlling crop plant diseases maintained by the USDA?
8. How does crop rotation and field sanitation help control crop plant diseases?
9. List several cultural practices that may help prevent crop plant diseases.
10. When is chemical use for control of plant diseases justified?
11. Name the two forms of chemical controls for plant diseases.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT I: Types, Breeds, and Origins of Livestock and Poultry

LESSON: Types, Breeds, and Origins of Livestock and Poultry Predominant in Louisiana

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify and discuss the characteristics, origins, and types of the major breeds of livestock and poultry found in Louisiana.

2. Specific:

a. Identify and define new terms.
b. Identify and describe the major breeds of beef cattle, dairy cattle, sheep, swine, horses, and poultry.
c. Name the popular breeds, if any, in the local area.
d.

e.

f.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th Edition, Danville: Interstate Publishers, 1977.

2. Animal Science I, LSU Cooperative Extension Service, Publication 1440.

3. Agricultural Summary Louisiana, 1980, LSU Cooperative Extension Service. (published yearly)

C. Special Arrangements

1. Secure livestock models, livestock and poultry magazines, and other breed association literature.
2. Arrange for field trip to view different breeds.

II. Presentation of Lesson

A. Motivation

1. Define beef-type cattle -- cattle developed primarily for the efficient production of meat.
2. List reasons why beef cattle are among the most important of farm animals.
3. Indicate that beef cattle furnishes, in addition to food, material for items such as medicines, soaps, and glue.
4. Discuss beef cattle as an important agricultural income in Louisiana (gross income of $220,800,000 in 1980).
5. Discuss beef cattle as utilizing land that might otherwise be non-productive. (Double cropping soybean land with rye-grass and grazing cattle.)

B. Content Outline

1. Terms

a. Bos indicus -- Scientific classification of cattle that are native to India.

b. Calves -- Young cattle of either sex less than one year old.

c. Castrate -- To remove the testes of male cattle.

d. Bulls -- Uncastrated male cattle of any age.

e. Steers -- Male cattle that were castrated at an early age before any sex characteristics developed.

f. Heifers -- Female cattle that have not had calves.

g. Cows -- Female cattle that have had one or more calves.

h. Bos taurus -- The scientific classification of cattle which are native to Europe and the more temperate zones.

i. Crossbreed -- The mating of one breed to another.

j. Type -- The desired form of an animal which adopts it for a particular purpose.

k. Conformation -- Refers to shape and design of an animal.

l. Hybrid vigor -- The increase in vigor and performance resulting when two animals of unrelated breeds are crossed.

m. Polled -- Cattle that are born without horns.

n. Horned -- Cattle that are born with the ability to produce horns.

4

o. **Breed** -- Group of animals that have similar external characteristics that are passed on from generation to generation.

p. **Purebred** -- A beef animal, both of whose parents are of the same breed and are recorded with the registry association.

q. **Breeder** -- The owner of the parents of a calf at the time mating took place.

r. **Breed** -- To mate a cow with a bull.

s. **Beef-type** -- An animal that has the ability to efficiently convert feed into high quality meat for human consumption.

2. Major beef cattle breeds in Louisiana

a. Angus

b. Hereford

c. Shorthorn

d. Brahman

e. Other
   1) Charolais
   2) Santa Gertudis
   3) Brangus
   4) Beef Master
   5) Crossbreeds and grades
   6) Simmental
   7) Red Poll
   8)
   9)
   10)
   11)

3. Origin and characteristics of major breeds

a. Angus

Origin	Characteristics
Origin is speculative, some claim they originated from a horned breed in Scotland; others claim they sprang from polled cattle of Britain Native home is North-eastern Scotland. The first importation was a cow in 1850 from Scotland. George Grant imported three bulls in 1873 for use on commercial cattle. First herd was imported to Canada in 1876.	Color: Black, but small amounts of white on the underline in front of the navel is permissible. Polled Size: a) Compact, closely built, b) Average mature weight (1)Male: 1000-1400 lbs. (2)Female: 750-900 lbs. Sexual Maturity: Male: 7-10 months Female: 6-9 months Temperament: Nervous in nature but generally easily gentled Production: a) Breeding Performance (1) Easily adapted to hot and cold climates (2) Good mothering ability (3) Highly prolific (4) High percent birth rate (5) Low to average birth weight (6) Average milkers (7) Average growth weight (8) High percent weaning rate b) Feeding Performance (1) Average to high feed conversion (2) Average to high daily weight gain (growth rate) (3) Average to high live grade c) Slaughter Performance (1) High carcass grade (2) Average dressing percent (3) Average to high percent of high priced cuts (4) High percent of marbling (5) High tenderness (low shear force)

6

b. Hereford

Origin	Characteristics
Originated in Hereford County, England First imported to U.S. in 1817 to Kentucky by Henry Clay	Color: Red bodies ranging from light to deep red. White faces, underline, flank, crest, switch, breast, and below knees and back. Red neck or white extending breast, and below knees and back. Red neck or white extending behind withers on back, too high in flanks or above knees and back is objectionable. Horned Size: a) Upstanding, large bones, heavily muscled; b) Average mature weight (1) Male: 1200-1800 lbs. (2) Female: 800-1000 lbs. Sexual Maturity: Male: 9-13 mon Female: 8-12 months Temperament: Very docile, easil handled and gentled Production: a) Breeding Performance (1) Easily adapted to hot or cold climates (2) Good mothering ability (3) Highly prolific (bulls and cows) (4) High percent birth rate (5) Average birth weight (6) Low to average milkers (7) Average growth rate (8) High percent weaning rate b) Feeding Performance (1) High feed conversion (2) High daily rate of gain (growth rate) (3) High live grade

c. Brahman

Origin	Characteristics
Originated in India Imported to U.S. in 1849 by James Bolton Davis of South Carolina.	Color: White to dark gray with black humps, necks, and lower legs, light to dark red, gray or red with white, red, or brown spots, brown and black with white spots. Horned: With large hump over shoulders, abundance of loose skin under neck and dewlap. Size: a) Large, long legs, slender bodies, heavily muscled; b) Average mature weight: (1) Male: 1400-2000 lbs. (2) Female: 1000-1250 lbs. Sexual Maturity: Male: 12-15 months Female: 11-13 months Temperament: Extremely docile if quietly handled, but highly nervous if mishandled. Production: a) Breeding Performance (1) Adapted to hot dry climates (2) Average mothering ability (3) Average prolificacy (4) Average birth rate (5) High birth weight (6) Good milkers (7) High growth rate (8) Average percent weaning rate b) Feeding Performance (1) Average to high feed conversion (2) High daily rate of gain (3) Low to average live grade c) Slaughter Performance (1) Average to high carcas grade

(2) Average dressing percent
(3) High percent high-priced cuts
(4) Low marbling
(5) Low tenderness (high shear force)

d. Shorthorn

Origin	Characteristics
Developed by Thomas Bates in England in the early 1700's	Color: Roan, other combinations of red and white.
Bred for a dual-purpose type	Originally horned, but polled strains have been developed.
American farmers began developing herds as early as 1885.	Size: a) Cattle tend to be of a larger frame and higher off the ground than common beef type; b) Mature weights (1)Male: 2000-2500 lbs. (2)Female: 1400-1800 lbs.
Imported to Virginia in 1843.	Temperament: Inclined to be slightly nervous and flighty.
	Production: a) Cows show good mammary development b) Very competitive in beef producing qualities c) Variation in type presents a problem in the showring

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major beef breeds.
3. Interview local farmers regarding their preferences of beef breeds.
4. Conduct a survey to determine major beef breeds produced in the local area.
5. Prepare a report outlining the products and utilization of beef cattle in Lousiana.
6. Take a field trip to a cattle ranch.
7. Write to breed associations for breed information.

Angus: American Angus Assn.
3201 Frederick Blvd.
St. Joseph, MO 64501

Brahman: American Brahman Breeders
1313 LaConcha Lane
Houston, TX 77054

Charolais: American-International Charolais Assn.
1610 Old Spanish Trail
Houston, Texas 77025

Hereford: American Hereford Assn.
715 Hereford Drive
Kansas City, MO 64105

Shorthorn: American Shorthorn Assn.
8288 Hascoll Street
Omaha, NE 68124

Simmental: American Simmental Assn.
1 Simmental Way
Bozeman, Mont. 59715

10 II. Presentation of Lesson

A. Motivation

1. Define dairy-type cattle -- cattle that produce milk for human consumption.
2. Define dairymen -- farmers who raise dairy cows and sell their milk. (Number of people working on dairy farms in Louisiana is 3,340) 1980.
3. Discuss current number of dairy farms and number of cattle in Louisiana. (1,100 producers and approximately 110,000 cows) 1980.
4. Discuss the on-farm and processing/retail values of milk in Louisiana. ($272 million) 1980.
5. Discuss why it is important to have dairy farms near centers of consumption (cities, for example).

B. Content Outline

1. Terms

   a) Type -- An ideal or standard of perfection combining all the characteristics that contribute to the animal's usefulness for a specific purpose.

   b) Species -- A scientific classification of living organisms. It is the final category under which there are no separate sub-groups.

   c) Breed association -- Organizations formed for the purpose of promoting a breed of livestock. The association also maintains the official registration of the pedigree of individual animals which conform to the breed standards.

   d) Dairy type -- Characterized by a lean, angular form and a well developed mammary system. This type is especially adapted to efficiently convert feed into the maximum amount of high quality milk.

   e) Pedigree -- A written statement giving the record of an animal's ancestry.

   f) Dual-purpose type -- Intermediate between the beef type and dairy type in conformation and also in the production of both meat and milk.

   g) Mammary system -- The milk-producing system of a female bovine animal.

2. Major dairy cattle breeds in Louisiana

   a) Guernsey

   b) Holstein-Friesian

   c) Jersey

   d) Other
      1) Ayrshire
      2) Brown Swiss

3. Origin and characteristics of major breeds

a. Guernsey

Origin	Characteristics
Island of Guernsey off the coast of France. Brought to U.S. in 1831. Often referred to as the "Golden Guernsey" because of the rich yellow color of the milk	Color: Varies from a light fawn to red with white markings on face, legs, switch, and flank; the nose should be buff or cream colored and the skin yellow. Horned Size: a) Smaller-framed, less rugged than Holstein; b) Average mature weight (1) Male: 1500-1800 lbs. (2) Female: 800-1100 lbs. c) Calves at birth weigh 65 to 75 lbs. Temperament: Females are active but not nervous; bulls are generally docile but may be vicious if mishandled. Production: a) Milk - high producers but usually not as high as the Holstein b) Butterfat - averages from about 4.5% to 5% c) Milk quite often sells at a premium on the market becaus of its golden color.

b. Holstein-Friesian

Origin	Characteristics
Originated in Holland and were called Friesians	Color: Black and white, ranging from white with a few black spots to almost black.
First imported to U.S. in 1795	Horned
Bred to produce a large amount of milk	Size: a) Large-framed and ruggedly built with large feeding capacities and udders; b) Average mature weight (1)Male: 1700-2000 lbs. (2)Female: 1100-1600 lbs. c) Calves at birth weigh 85 to 95 lbs. and are large and vigorous.
	Temperament: Females are quiet and docile but bulls may be vicious.
	Production: a) Milk - one of the highest producing breeds in total pounds b) Butterfat - low percentage averaging about 3.5% but due to large amount of milk produced, rate high in total butterfat production.
	A summary of the nation's DHIA records shows that more Holsteins were on production test than all other dairy breeds combined.

c. Jersey

Origin	Characteristics
Originated on the Island of Jersey in the English Channel First imported to U.S. in 1850	Color: a) Body varies from light fawn to black and from spotted to solid-colored; b) The switch may be black or white, the muzzle is generally black, and the tongue may be black or white. Horned Size: a) The Jersey is the smallest of the dairy breeds but approaches the true dairy type; b) Average mature weight (1) Male: 1200-1500 lbs. (2) Female: 600-900 lbs. Calves weigh 50 to 60 lbs. at birth. Temperament: Females inclined to be nervous and sensitive but are very docile under good management conditions. Bulls are prone to be quite vicious. Production: a) Milk - do not produce as large quantity as the larger breeds b) Butterfat - averages about 5.3% c) Milk sells at a premium because of its superior quality. Good dairy character is reflected in straight top lines, level rumps, and sharp withers.

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major dairy breeds.
3. Interview local farmers regarding their preferences in selecting a dairy breed.
4. Conduct a survey to determine major dairy breeds of local area.
5. Prepare a report on dairy products produced in Louisiana.
6. Take a field trip to a dairy farm.
7. Write to breed associations for breed information.

Jersey: American Jersey Cattle Club
2105-J So. Hamilton Road
Columbus, Ohio 43227

Holstein-Friesian: Holstein-Friesian Assoc.
P. O. Box 808
Brattleboro, Vermont 05301

Guernsey: American Guernsey Cattle Club
Peterborough
New Hampshire 03458

Ayrshire: Ayrshire Breeder's Assn.
Brandon, VT 05733

Brown Swiss: Brown Swiss Cattle Assn.
Box 1038
Beloit, Wisconsin 53511

II. Presentation of Lesson

A. Motivation

1. Discuss the importance of hogs as a source of food. (Per capita consumption of pork in Louisiana of 74 to 78 lbs. per year for 1980.)

2. Discuss the economic impact of the swine industry in Louisiana. (Gross farm income of $17,500,000 for 1980.)

3. Display items made from hogs: leather, soaps, brushes, glue, medicine, shoes, hats, etc.

B. Content Outline

1. Terms

   a. Lard type -- Produced primarily for lard production. This type is excessively fat, slow maturing, and an inefficient user of feed.

   b. Bacon type -- The opposite extreme of the lard type having a thin layer of back fat and a high percentage of bone and skin in the carcass.

   c. Meat type -- The intermediate type which yields a carcass high in lean meat but comparatively low in fat.

   d. Pig -- Young swine of either sex under one year of age.

   e. Hog -- Mature swine of either sex over one year of age.

   f. Gilt -- Female pig that has not had a litter of pigs.

   g. Sow -- Female hog that has had a litter of pigs.

   h. Boar -- Male animal of the swine family.

   i. Barrow -- Small boar hog, castrated when young.

   j. Shoat -- A young swine.

   k. Purebred -- A pig or hog, both parents of which are the same breed.

   l. Stag -- A male castrated after maturity.

   m. Litter -- Number of pigs to which a sow gives birth.

   n. Registered animal -- Purebred pig recorded with the national breed association.

   o. Dam -- Mother of the pig.

   p. Sire -- Father of the pig.

q. Grade -- A pig or hog that has one purebred parent.

r. Scrub -- A pig or hog of unknown ancestry.

2. Major swine breeds in Louisiana

   a. Hampshire

   b. Yorkshire

   c. Poland China

   d. Duroc

   e. Other
      1) Chester White
      2) Landrace
      3) Crossbreeds

3. Origin and characteristics of major breeds.

a. Hampshire

Origin	Characteristics
Developed in Boone County, Kentucky, from foundation stock known as Thin Rinds and Belted hogs	Color: Black, with white encircling the body and including front legs. Erect ears
Breed association started in 1893	Size: a) Smaller, more refined than some of the other breeds; b) Average mature weight (1) Male: 400-600 lbs. (2) Female: 350-550 lbs. Exhibits a longer face than most other breeds Sows are very prolific and make good mothers. Used very extensively in crossbreeding

b. Yorkshire

Origin	Characteristics
Originated in England; known as the "Large White"	Color: White, with occasional black pigment spots in the skin Erect ears; slightly dished face
Imported in 1893 to Minnesota	Size: a) Large, long deep bodied, large boned and framed; b) Average mature weight (1) Male: 700-1000 lbs. (2) Female: 450-650 lbs. c) Prolific d) Widely used in cross-breeding, excellent feed efficiency, and third most popular breed.

c. Poland China

Origin	Characteristics
Originated in the Miami Valley region of Ohio in early 1800's	Color: Black with blazed white face, white feet, and white tip of tail.
	Drooping ears
Originated for the purpose of converting corn into pork, and became the first lard-type hog	Size: a) Very large and upstanding; b) Average mature weight (1) Male: 550-800 lbs. (2) Female: 500-650 lbs.
Stock included the white Byfield hog imported from Russia, the big China hog from Philadelphia, the Berkshire, and the Irish Grazer from Ireland along with native hogs from the area.	Exhibits good length and good hams
	Produces highly desirable carcasses

d. Duroc

Origin	Characteristics
New England States from the Jersey Reds, red Durocs, and red Berkshires	Color: Red, varying from a golden yellow to a deep red. Black flecks may appear but spots are objectionable.
Breed standard set in 1885	Drooping ears
	Size: a) Large, excellent feeding capacity; b) Average mature weight (1) Male: 500-750 lbs. (2) Female: 450-650 lbs.
	In type and conformation, produces a very desirable carcass.
	Sows are prolific and have good mothering ability.

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major swine breeds.
3. Interview local farmers regarding their preferences for swine breeds.
4. Conduct a survey to determine major swine breeds of local area.
5. Prepare a report outlining the products produced from swine.
6. Take a field trip to a swine farm.
7. Write to breed associations for breed information.

Hampshire:
Hampshire Swine Registry
1111 Main Street
Peoria, Illinois 61606

Yorkshire:
American Yorkshire Club
Box 2417
Lafayette, Indiana 47906

Poland China:
Poland China Record Assn.
P. O. Box 71
Galesburg, Illinois 61401

Duroc:
United Duroc Swine Registry
1803 W. Detiveiller Drive
Peoria, Illinois 61614

Chester White:
Chester White Swine Record Assn.
P. O. Box 228
Rochester, Indiana 46975

Landrace:
American Landrace Assn., Inc.
P. O. Box 111
Culver, Indiana 46511

II. Presentation of Lesson

A. Motivation

1. Discuss the uses of sheep products
    a) Lamb -- food
    b) Wool -- clothing
    c) Raw materials for by-products
        1) Fertilizers
        2) Candles
        3) Catgut -- stringing tennis racquets
2. Discuss economic and population data of sheep in Louisiana
    a. Gross farm income -- $895,000 (1980)
    b. 16,000 breeding sheep in Louisiana (1980)
    c. 31 parishes report sheep being grown (1980)
    d. 850 purebred and commercial producers (1980)
    e. 2,000 to 2,500 individuals involved in sheep production in Louisiana (1980)

B. Content Outline

1. Terms
   - a. Ewe -- Female sheep
   - b. Lamb -- Sheep of either sex under 12 months of age
   - c. Lambing -- Giving birth to young
   - d. Pedigree -- Official record of a lamb's ancestors
   - e. Ram -- Male sheep of any age (uncastrated)
   - f. Wether -- Male lamb castrated at an early age before any sex characteristics develop
   - g. Yearling -- Sheep of either sex over 12 months old but less than 24 months old
   - h. Mutton -- Meat from sheep over one year of age
2. Major sheep breeds in Louisiana
   - a. Hampshire
   - b. Suffolk
   - c. Southdown
   - d. Louisiana native
   - e. Other
     - 1) Rambouillet
     - 2) Columbia
     - 3) Shropshire
     - 4) Dorset
3. Basis for classification of sheep
   - a. Degree of suitability for mutton or wool production
   - b. Color of face (white or black)
   - c. Presence or absence of horns

d. Topography of the area in which they originated

e. Type of wool produced

4. Six classifications of sheep

   a. Fine wool type

   b. Medium wool type

   c. Long wool type

   d. Fur type

   e. Crossbred wool type

   f. Carpet wool type

5. Origin and characteristics of major breeds

   a. Hampshire -- Hampshire sheep originated in the hills in Southern England. The Hampshire is a dark-faced, hornless, medium-wool breed. The head and ears are black and the legs are of lighter color. It is blocky, having a large frame, and is rather tall, heavy-boned, and rugged in appearance.

   b. Suffolk -- Suffolks were developed in England by mating Norfolk horned ewes with Southdown rams. The face and legs are bare and are dark black. They have large bodies. The wool is short and light in weight and contains some black fibers.

   c. Southdown -- Southdowns originated in the Sussex hills of England. It is the oldest of all British breeds. The Southdown is readily recognized by its very blocky, low-set appearance. The width of the back, thickness of loin with the plumpness of the legs and twist are breed points of great value The fleece is very dense, fine and often short to weigh heavily. The face is sometimes covered with wool and varies in its color from brown to mouse color or very light gray. The legs show the same color as the face.

d. Native -- The origin of the Louisiana native is unknown but has been in Louisiana since the early 1800's. It is thought that they are descendants of the sheep brought into Southwestern United States by the early Spanish settlers and those brought into Louisiana by the early settlers from the Eastern states. The Louisiana Native sheep is small, having an angular body. The face, legs, and belly are free of wool. They may be either polled or have large curved horns. The wool is of medium length. They produce about four pounds of white wool each year.

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major sheep breeds.
3. Interview local farmers regarding their preferences for sheep breeds.
4. Conduct a survey to determine major sheep breeds of local area.
5. Prepare a report outlining the products produced from sheep.
6. Take a field trip to a sheep ranch.

7. Write to breed associations for breed information.

Hampshire:
American Hampshire Sheep
Route 10, Box 199
Columbia, MO 65201

Suffolk:
American Suffolk Sheep Society
55 East 100 North
Logan, Utah 84321

Southdown:
American Southdown Breeders' Assn.
Route 4, Box 14-B
Bellefonte, PA 16283

Native:
Terry Lee Dumas
Division of Animal Science
Cooperative Extension Service
Louisiana State University
Baton Rouge, LA 70803

Rambouillet:
American Rambouillet Sheep Breeders
2709 Sherwood Way
San Angelo, TX 76901

Columbia:
Columbia Sheep Breeders' Assn.
P. O. Box 272
Upper Sandusky, Ohio 43351

Shropshire:
American Shropshire Registry Assn.
P. O. Box 1970
Monticello, Illinois 61856

Dorset:
The Continental Dorset Club
P. O. Box 577
Hudson, Iowa 50643

II. Poultry

A. Motivation

1. Discuss the importance of poultry as a source of food (meat and eggs).

2. Discuss growth of poultry industry in Louisiana -- breeder flocks, hatcheries, feed mills, processing plants, and distribution centers.

3. State gross farm value of Louisiana poultry ($140 million-1980).

4. Compare the number of breeds and varieties with that of other animals (342 breeds of poultry).

5. Discuss how meat-type poultry differs from the egg-type birds.

B. Content Outline

1. Terms

a. American Standard of Perfection -- A publication of the American Poultry Association containing a complete listing and description of all recognized varieties of fowl.

b. Broiler -- A young chicken eight to ten weeks of age raised for meat production.

c. Class of chickens -- Refers to the area where the breed or variety of chicken was developed. The four classes are American, Asiatic, Mediterranean, and European.

d. Breed of chickens -- Chickens that are similar in body shape and form, and that are members of the same class.

e. Variety of chickens -- A subdivision of the breed of chickens and is determined by plumage color and the comb.

f. Strain of chickens -- A family name used to designate the breeder.

g. Hen -- Mature female chicken.

h. Capon -- Castrated male fowl.

i. Cock -- Mature male fowl.

j. Cockerel -- Immature male fowl usually less than one year of age.

k. Pullet -- Immature female fowl which has not layed.

l. Rooster -- An adult male chicken.

m. Brooder -- A heated enclosure in which young chickens or other fowl are raised.

n. Incubator -- A device that maintains a controlled environment and constant temperature (99° to 100°F) for hatching chicks.

2. Major breeds of poultry in Louisiana
    a. White Plymouth Rock (meat type)
    b. Single Comb White Leghorn (egg type)
3. (See Information Sheet)

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major poultry breeds.
3. Interview local farmers regarding their preferences in poultry breeds.
4. Conduct a survey to determine major poultry breeds of local area.
5. Prepare a report outlining the products and utilization of poultry in Louisiana.
6. Take a field trip to a poultry operation.
7. Write to American Poultry Association for The American Standard of Perfection.

Information Sheet

Origin and characteristics of the common breeds of chickens

Classes and Breeds	Weight (lbs.)	Comb Type	Color of Ear Lobes
American			
White Plymouth Rock	7½ to 9½	Single	Red
New Hampshire	6½ to 8½	Single	Red
Jersey White Giant	10 to 13	Single	Red
Rhode Island Red	6½ to 8½	Single and Rose	Red
Wyandotte	6½ to 8½	Rose	Red
Asiatic			
Langshan (Black)	7 to 10	Single	Red
Cochin	8½ to 11	Single	Red
Brahma (Light)	9 to 11	Pea	Red
English			
Cornish (Dark)	8 to 10	Pea	Red
Orpington (Buff and White)	8 to 10	Single	Red
Australorp	6½ to 8½	Single	Red
Mediterranean			
Leghorn	4½ to 6	Single and Rose	White
Minorca (White)	6½ to 8	Single	White
Ancona	4½ to 6	Single and Rose	White

(continued)

Classes and Breeds	Color of Shanks and toes	Skin Color	Egg Color	Egg Production (High, Medium, or Low)
American				
White Plymouth Rock*	Yellow	Yellow	Brown	Medium
New Hampshire	Yellow	Yellow	Brown	Medium
Jersey White Giant	Yellow	Yellow	Brown	Medium
Rhode Island Red	Yellow	Yellow	Brown	Medium
Wyandotte	Yellow	Yellow	Brown	Medium
Asiatic				
Langshan (Black)*	Bluish black	White	Brown	Low
Cochin	Yellow	Yellow	Brown	Low
Brahma (Light)	Yellow	Yellow	Brown	Low
English				
Cornish (Dark)*	Yellow	Yellow	Brown	Medium to Low
Orpington (Buff and White)	White	White	Brown	Medium
Australorp	Dark Slate	White	Brown	Medium
Mediterranean				
Leghorn*	Yellow	Yellow	White	High
Minorca (White)	White	White	White	Medium to High
Ancona	Yellow	Yellow	White	Medium to High

* Popularity (most popular within class)

II. Presentation of Lesson

A. Motivation

1. Present a brief history of the horse including:
    a. Evolution,
    b. Establishment on the North American continent,
    c. Domestication by man, and
    d. Role in development of America.
2. The horse industry contributes an estimated 450 million dollars to the economy of Louisiana (1981).
3. The total horse population in Louisiana (1981) is in excess of 225,000, owned by an estimated 75,000 people.
4. Discuss total income generated from production (breeders) in Louisiana (39 million dollars -- 1981).

B. Content Outline

1. Terms

a. Hand -- Unit of measurement equal to 4 inches. Horse height is measured from the top of the withers to the ground when the animal is standing squarely.

b. Light horse -- 14 hands and 2 inches to 17 hands high, weigh 900 to 1400 lbs. and is used primarily for riding, driving, or racing.

c. Pony -- Stands under 14-2 hands high and usually weighs less than 900 lbs.

d. Draft horse -- Stands 14-2 to 17-2 hands high, weighs 1400 lbs. or more and is used primarily for pulling loads and for other heavy work.

e. Stock horse -- Used to work primarily cows and other ranch work; must be agile, sure footed, and quick. The body should be short coupled (short loin) and powerful with good feet and legs. Above all these horses must possess "cow sense." Stock horses are now being shown throughout the country.

f. Race horse (running and harness) -- Demands of racing are the most strenuous of any made on the horse. Speed, great stamina, intelligence, and certainly feet and legs of the soundest kind are prerequisites.

g. Pleasure horse -- Covers an extremely wide range of types. Owners of pleasure horses take special pride in the appearance of their animals. Good dispositions and conformation are necessary for pleasure horses.

2. Classification of horses (depending on size, build, and use)
    a. Light horses
    b. Ponies
    c. Draft horses
3. Major breeds of horses in Louisiana
    a. American Saddle Horse
    b. Appaloosa
    c. Arabian
    d. Palomino
    e. Quarter Horse
    f. Shetland Pony
    g. Tennessee Walking Horse
    h. Thoroughbred
    i. Welsh Pony
    j. Pony of the Americas

4. Origin and characteristics of common breeds of horses

a. American Saddle Horse

Origin	Characteristics
United States; Fayette County, Kentucky	Color: Bay, brown, chestnut, gray, black, or golden Height: 15 to 16 hands Weight: 1000-1200 lbs.

b. Appaloosa

Origin	Characteristics
United States in Idaho, Oregon, and Washington From animals originating in Central Asia	Color: Variations and combinations of colors and spots, eyes encircled by white, mottled skin, hooves black and white spotted. Usually white over the loin and hips, with spots intermingled. Height: 14 to 15½ hands Weight: 900-1200 lbs.

c. Arabian

Origin	Characteristics
Arabia	Color: Bay, gray, and chestnut are predominant; white marks on the head and legs are common. Height: 15 to 15-1 hands Weight: 850-1100 lbs. The beautiful head and neck of the Arabian is one of its most distinguishing characteristics.

d. Palomino (color breed)

Origin	Characteristics
United States From animals of Spanish descent	Color: Golden and white, silver or ivory mane and tail; coat color is its greatest asset. Height: 14-2 to 16 hands Weight: 900-1300 lbs. The type desired in the palomino will depend entirely on the use for which the horse is intended. They are very popular as pleasure, saddle, stock, and parade horses.

e. Quarter Horse

Origin	Characteristics
United States; primarily in the southwestern states of Texas, Oklahoma, New Mexico, Colorado, and Kansas	Color: Chestnut, sorrel, bay, dun, black, brown, roan, palomino, gray and a few lighter shades occur. Height: 14 to 16 hands Weight: 1050-1300 lbs. Well-muscled and powerfully built; considered the most versatile of all breeds of horses. They are noted for quick getaway and great speed at short distances -- the quarter mile. Ideal to rope or cut cattle.

f. Shetland Pony

Origin	Characteristics
Shetland Isles	Color: Black, dark brown, bay, chestnut, mouse, and spotted are most common. Height: Two class sizes are recognized by breed registry; 43" and under; 43" to 46" Weight: 355-500 lbs. Develops long shaggy outer coat during winter months and has a full mane and tail. Smaller size is more desirable for the show ring.

g. Tennessee Walking Horse

Origin	Characteristics
Tennessee, United States	Color: Sorrel, chestnut, black, roan, white, bay, brown, gray, and golden Height: 14 to 15 hands Weight: 1000-1200 lbs. The running walk is distinctive to the breed.

h. Thoroughbred

Origin	Characteristics
England Developed as a running horse	Color: Bay, brown, chestnut, sorrel, black, and gray; white markings on the face and legs are common. Height: 15 to 17 hands Weight: 900-1400 lbs. Conformation emphasizes factors contributing to racing and sports.

C. Suggested Student Activities

1. Prepare scrapbook including pictures and descriptions of major breeds.
2. Conduct debate regarding personal preferences for major horse breeds.
3. Interview local farmers and horsemen regarding their preferences of horse breeds.
4. Conduct a survey to determine major horse breeds of local area.
5. Prepare a report outlining how horses are used in Louisiana.
6. Take a field trip to a horse ranch.
7. Write to breed associations for breed information.

Breeds of Light Horses

American Albino Association, Inc
Box 79
Crabtree, OR 97335

American Paint Horse Association
Box 12487
Fort Worth, TX 76116

American Saddle Horse Breeders Association
929 South Fourth Street
Louisville, KY 40203

Appaloosa Horse Club, Inc.
P. O. Box 403
Moscow, ID 83843

Arabian Horse Registry of America, Inc.
One Executive Park
7801 E. Belleview Avenue
Englewood, CO 80110

Cleveland Bay Society of America
White Post, VA 22663

The Morgan Horse Club, Inc.
P. O. Box 2157
West Hartford, CT 06117

The Palomino Horse Association, Inc.
P. O. Box 324
Jefferson City, MO 65101

Pinto Horse Association of America, Inc.
P. O. Box 3984
San Diego, CA 92103

American Quarter Horse Association
P. O. Box 200
Amarillo, TX 79105

Tennessee Walking Horse Breeders Association of America
P. O. Box 286
Lewisburg, TN 37091

Standardbred -- United States Trotting Association
750 Michigan Avenue
Columbus, OH 43215

Thoroughbred -- The Jockey Club
300 Park Avenue
New York, NY 10022

Breeds of Ponies

American Hackney Horse Society
527 Madison Avenue
Room 725
New York, NY 10022

Pony of the Americas Club, Inc.
P. O. Box 1447
1452 N. Federal Mason City, IA 50401

American Shetland Pony Club
P. O. Box 468
Fowler, IN 47944

Welsh Pony Society of America
Rural Delivery 1, Box 126-F
Glenmoore, PA 19343

COMMON LIVESTOCK TERMS

	Cattle	Horse	Swine	Sheep	Chickens
Mature Male	Bull	Stallion	Boar	Ram	Cock
Immature Male	Bull Calf	Colt	Boar Pig	Ram Lamb	Cockeral
Mature Female	Cow	Mare	Sow	Ewe	Hen
Immature Female	Heifer	Filly	Gilt	Ewe Lamb	Pullet
Castrated (Young)	Steer	Gelding	Barrow	Wether	Capon
Castrated (Old)	Stag	Gelding	Stag	Stag	Capon

D. Suggested Study Questions

1. Identify the terms related to types and breeds listed in this lesson.
2. Identify the major breeds of beef cattle. List their distinguishing characteristics.
3. Identify the major breeds of dairy cattle. List their distinguishing characteristics.
4. Identify the major breeds of sheep. List their distinguishing characteristics.
5. Identify the major breeds of swine. List their distinguishing characteristics.
6. Identify the major breeds of horses. List their distinguishing characteristics.
7. Identify the major breeds of chickens. List their distinguishing characteristics.
8. Name the popular livestock breeds for your area.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 1: Parts of Livestock and Poultry

I. Preparation for Instruction

   A. Student Objectives

      1. *Terminal*: Name the parts of livestock and poultry.

      2. *Specific*:

         a. Identify by name the various parts of livestock and poultry.
         b. Identify by location the various parts of livestock and poultry.
         c.

         d.

         e.

   B. Review Teaching Material

      Ensminger, M.E. *Animal Science*. 7th. Edition, Danville: Interstate Publishers, 1977.

   C. Special Arrangements

      1. Materials

         a. Farm periodicals (*Hoard's Dairyman, Farm Journal, Progressive Farmer*, etc.)
         b. Labeled transparencies (dairy, beef, etc.)
         c. Unlabeled handouts (to be labeled by student)

      2. Visit a livestock farm and poultry farm.

      3. Audio-visual equipment

         a. Reference materials (pictures by breed associations of ideal types with parts)
         b. Film showing how to select farm animals
         c. Overhead projector

II. Presentation of Lesson

A. Motivation

Discuss the importance of knowing the names of the livestock parts in order to make a correct reference when discussing desirable and undesirable traits.

B. Content Outline

1. Parts of beef cattle

    a. Labeled (Transparency II-1-A)
    b. Unlabeled (Handout II-1-A)

2. Parts of dairy cattle

    a. Labeled (Transparency II-1-B)
    b. Unlabeled (Handout II-1-B)

3. Parts of swine

    a. Labeled (Transparency II-1-C)
    b. Unlabeled (Handout II-1-C)

4. Parts of sheep

    a. Labeled (Transparency II-1-D)
    b. Unlabeled (Handout II-1-D)

5. Parts of horse

    a. Labeled (Transparency II-1-E)
    b. Unlabeled (Handout II-1-E)

6. Parts of poultry

    a. Labeled (Transparency II-1-F)
    b. Unlabeled (Handout II-1-F)

C. Suggested student activities

1. Draw and locate the parts for each class of livestock and poultry studied.

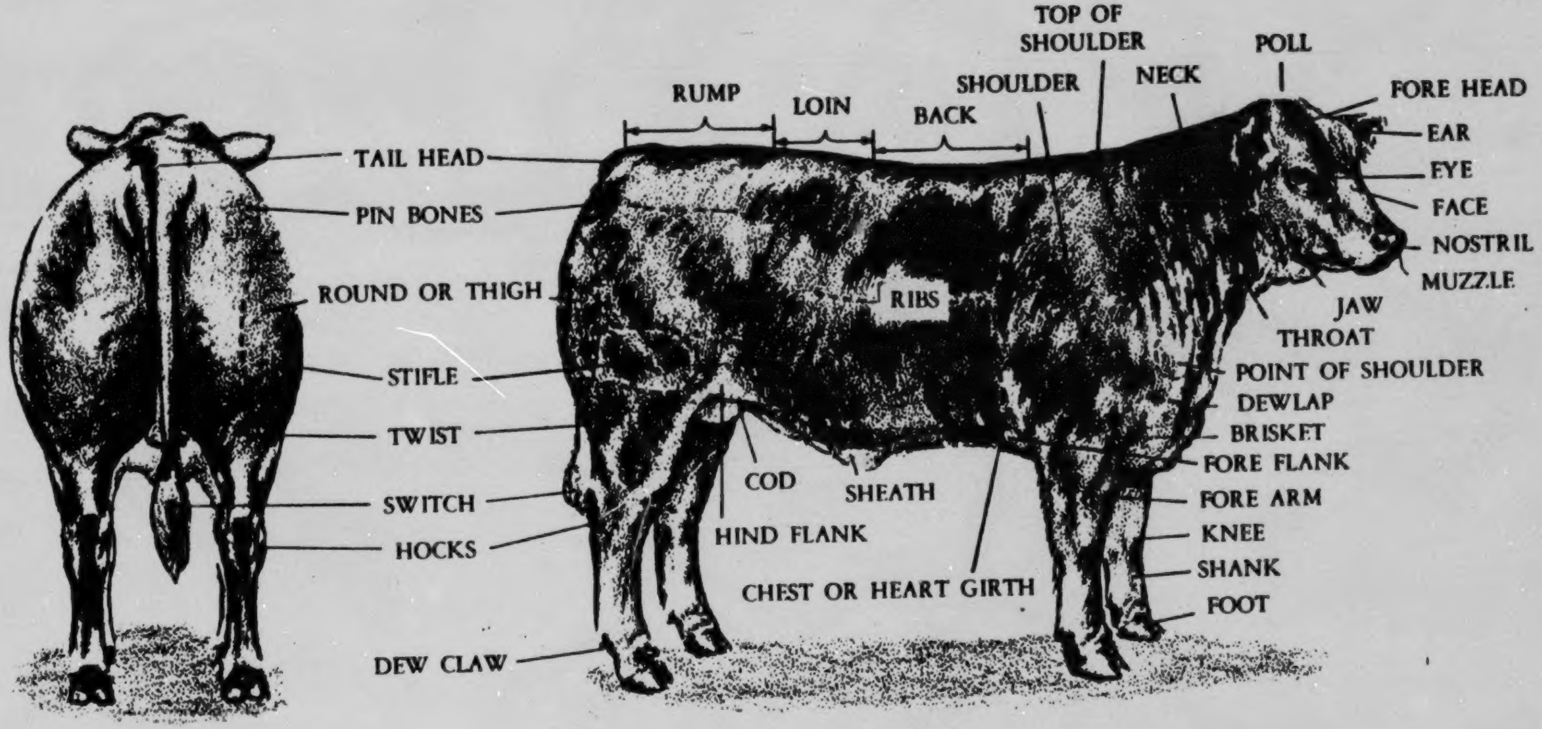
2. Prepare booklet of labeled drawings and pictures (from breed association literature or magazine).

3. Select pictures from a class of livestock or poultry to show to the students.

D. Suggested study question

Use labeled handouts of the different classes of livestock and poultry, and have the students fill in the name of parts.

PARTS OF A BEEF ANIMAL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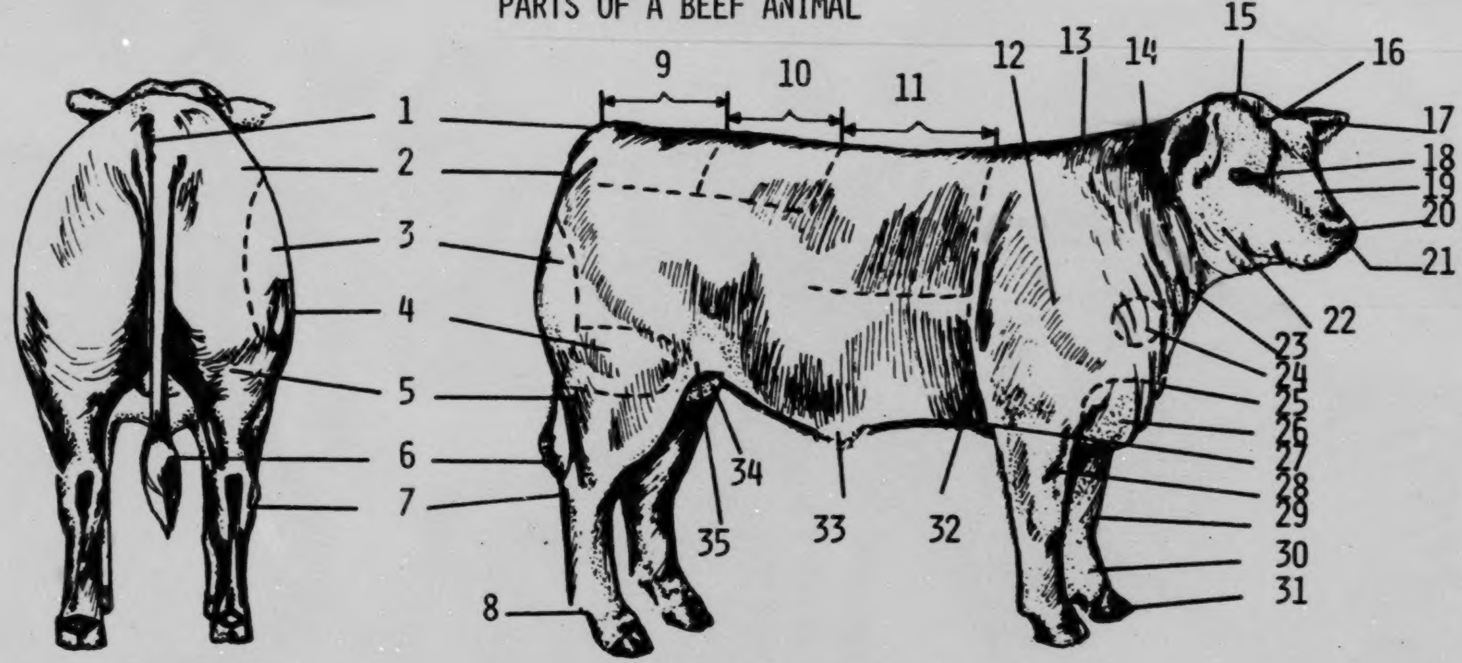
Transparency II-1-A

PARTS OF A BEEF ANIMAL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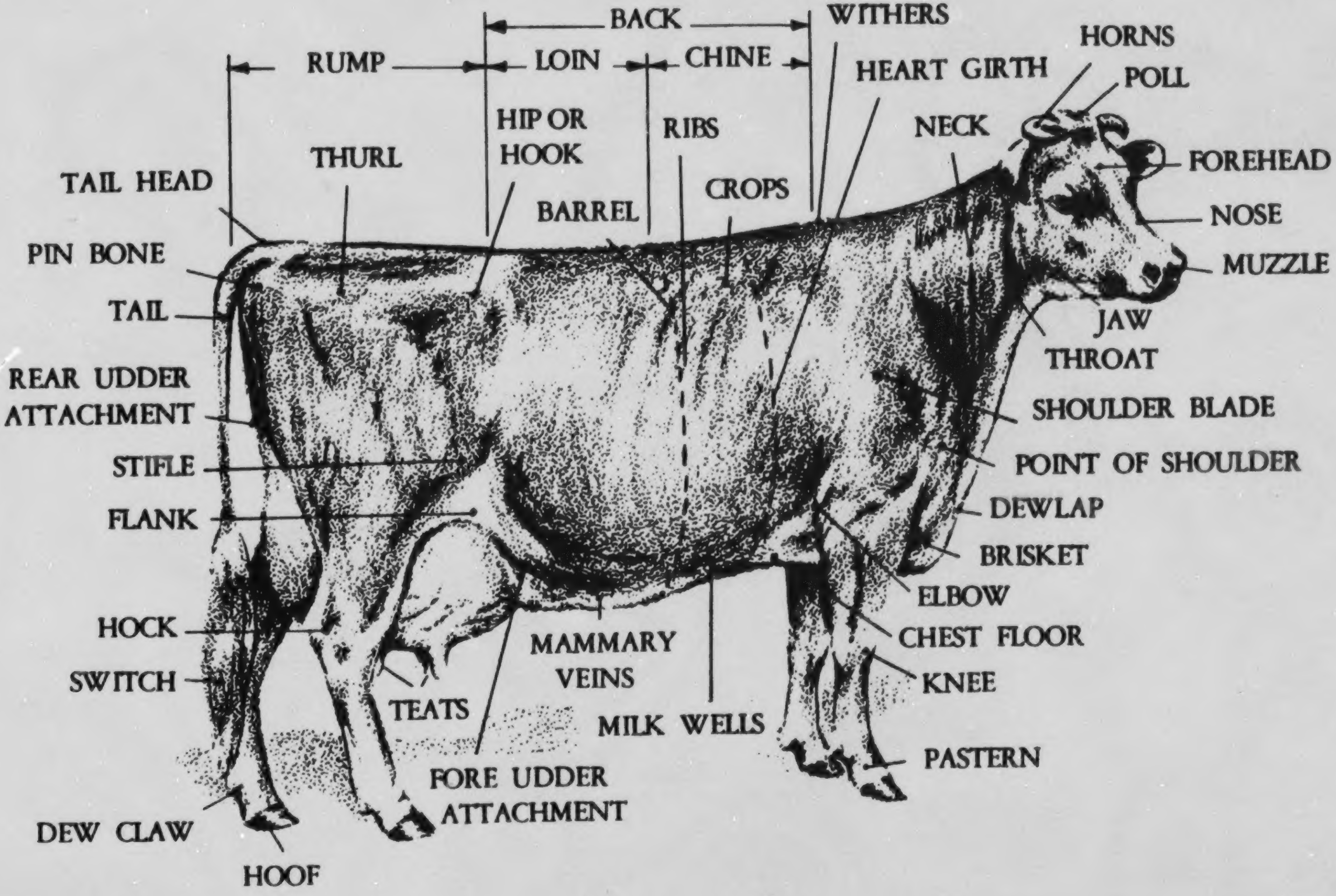
PARTS OF A DAIRY COW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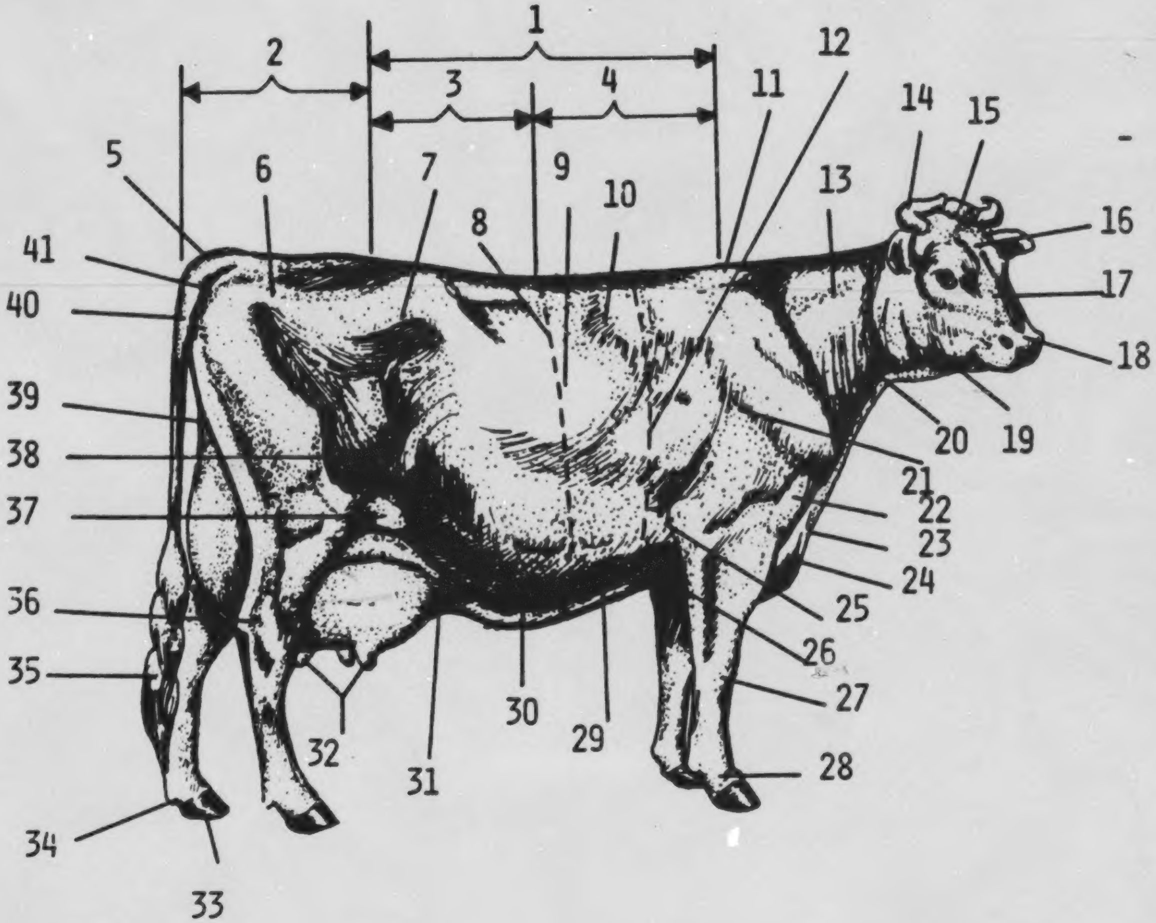
Transparency II-1-B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PARTS OF A DAIRY COW

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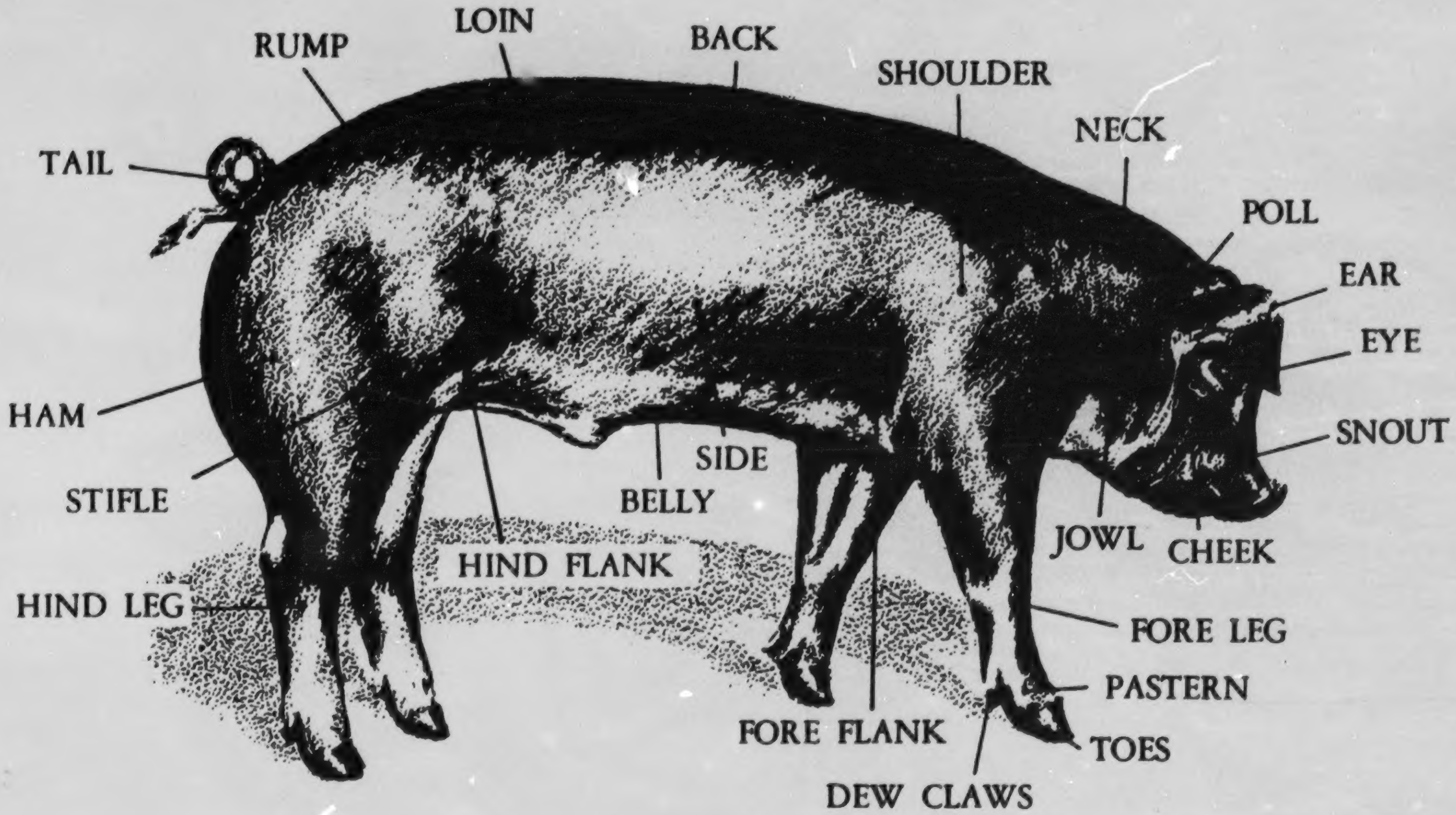
Handout II-1-B

PARTS OF A HOG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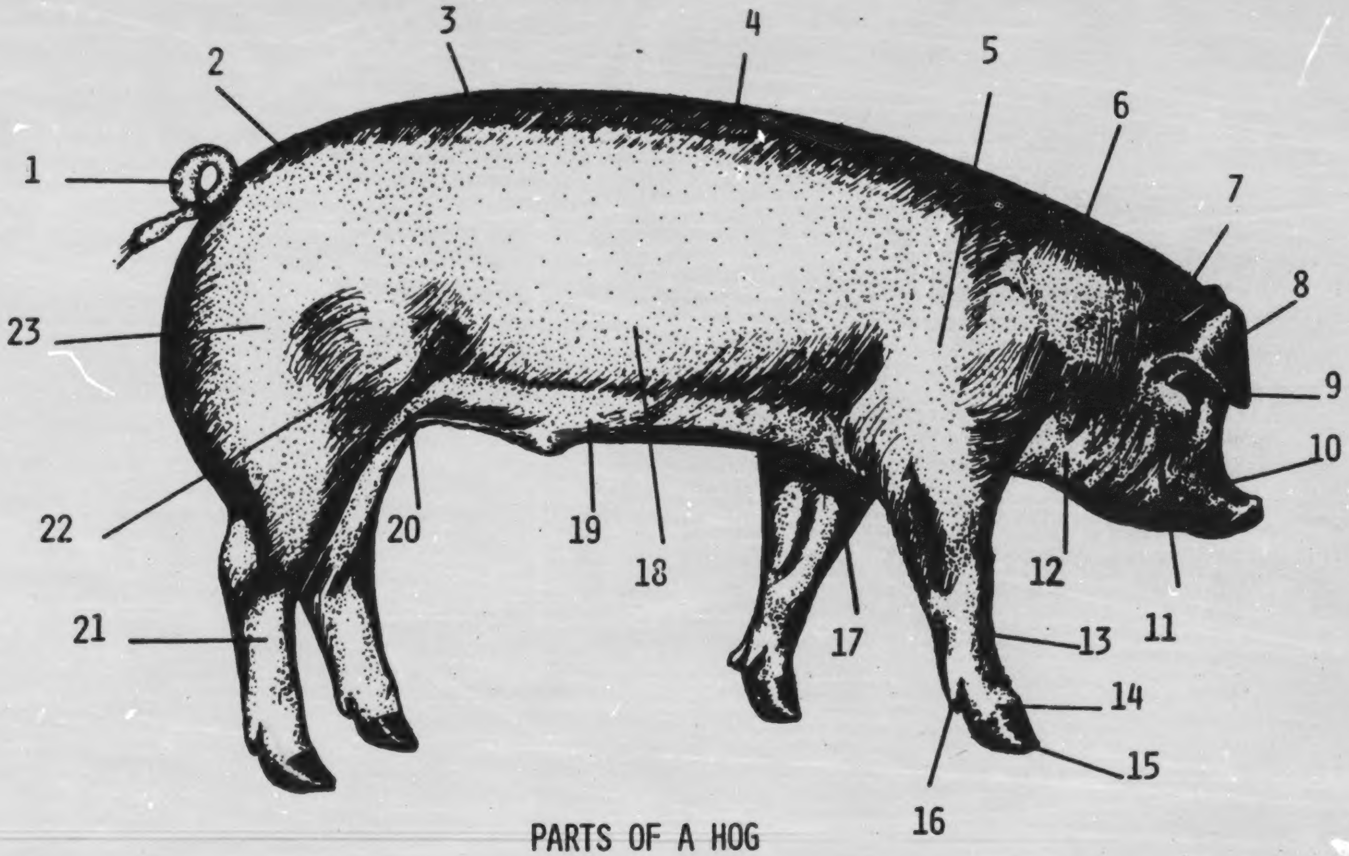
DEW CLAWS

Transparency II-1-C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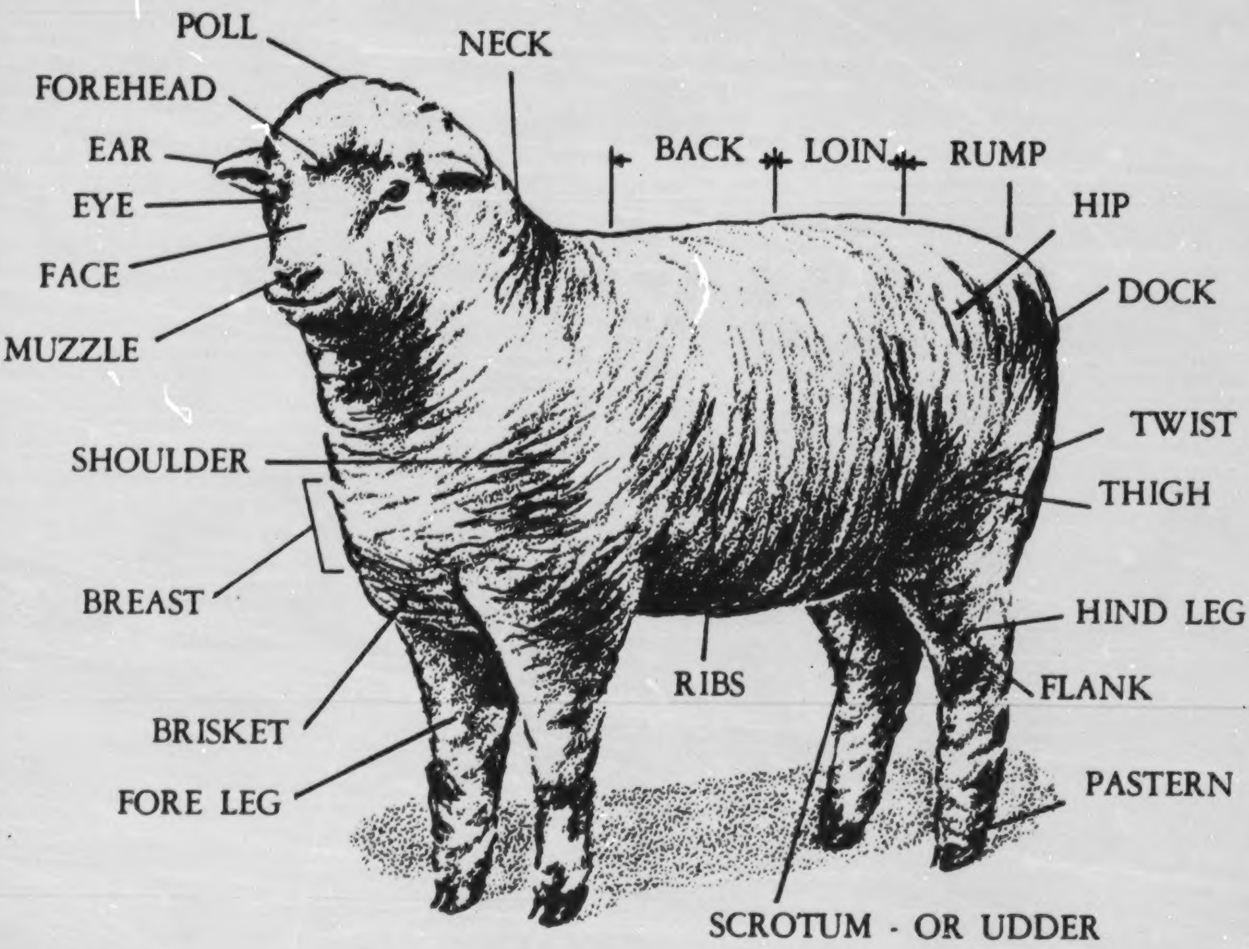
PARTS OF A SHEEP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SCROTUM - OR UDDER

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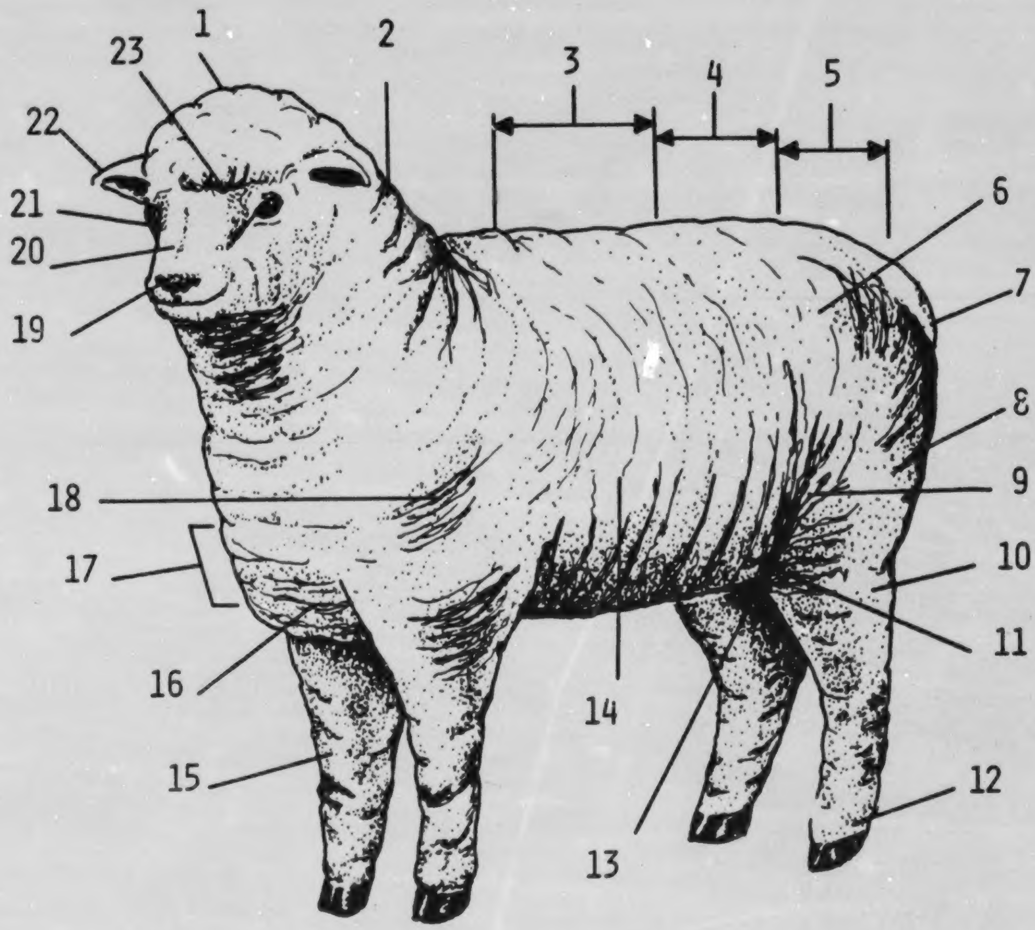
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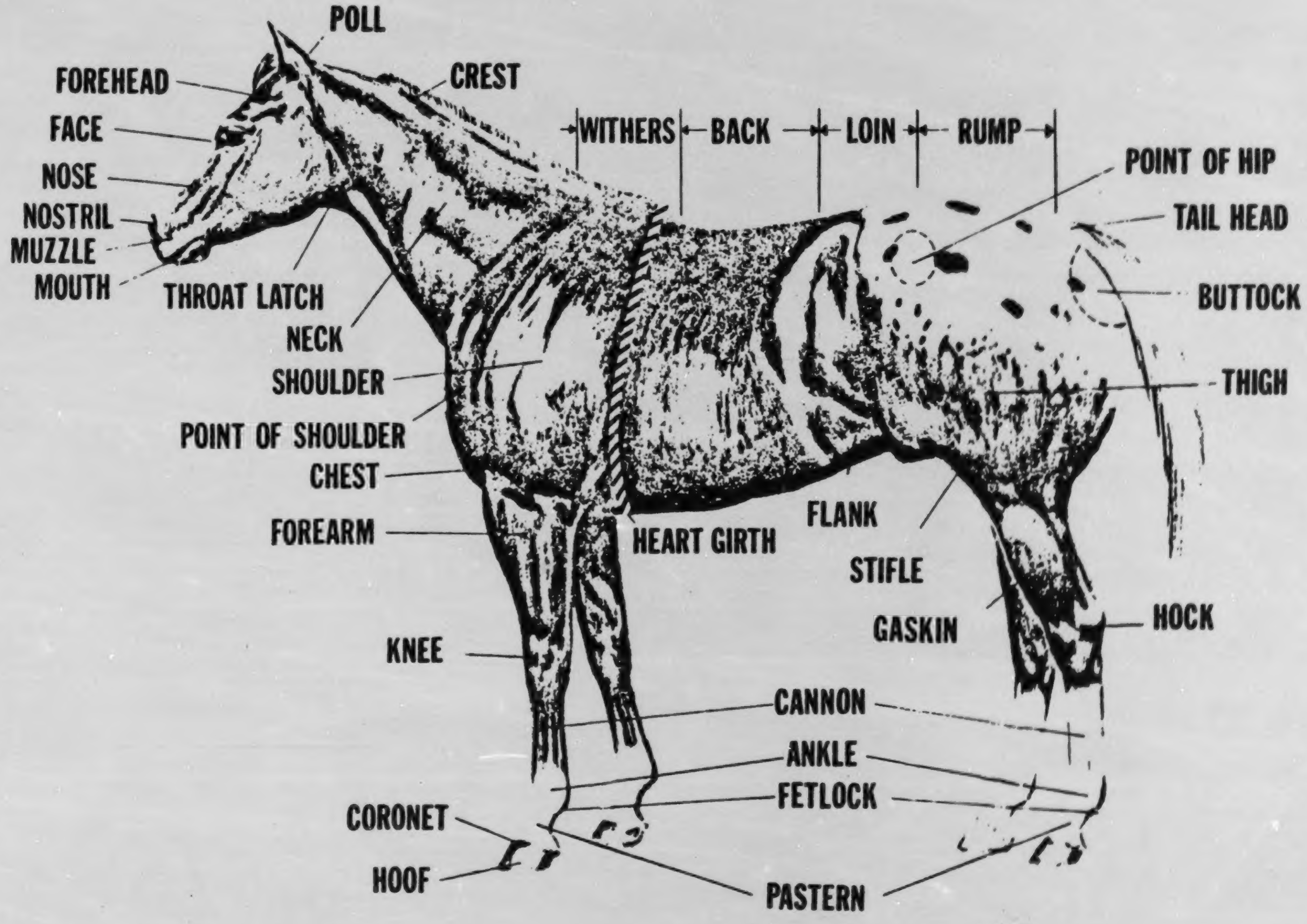
PARTS OF THE HORSE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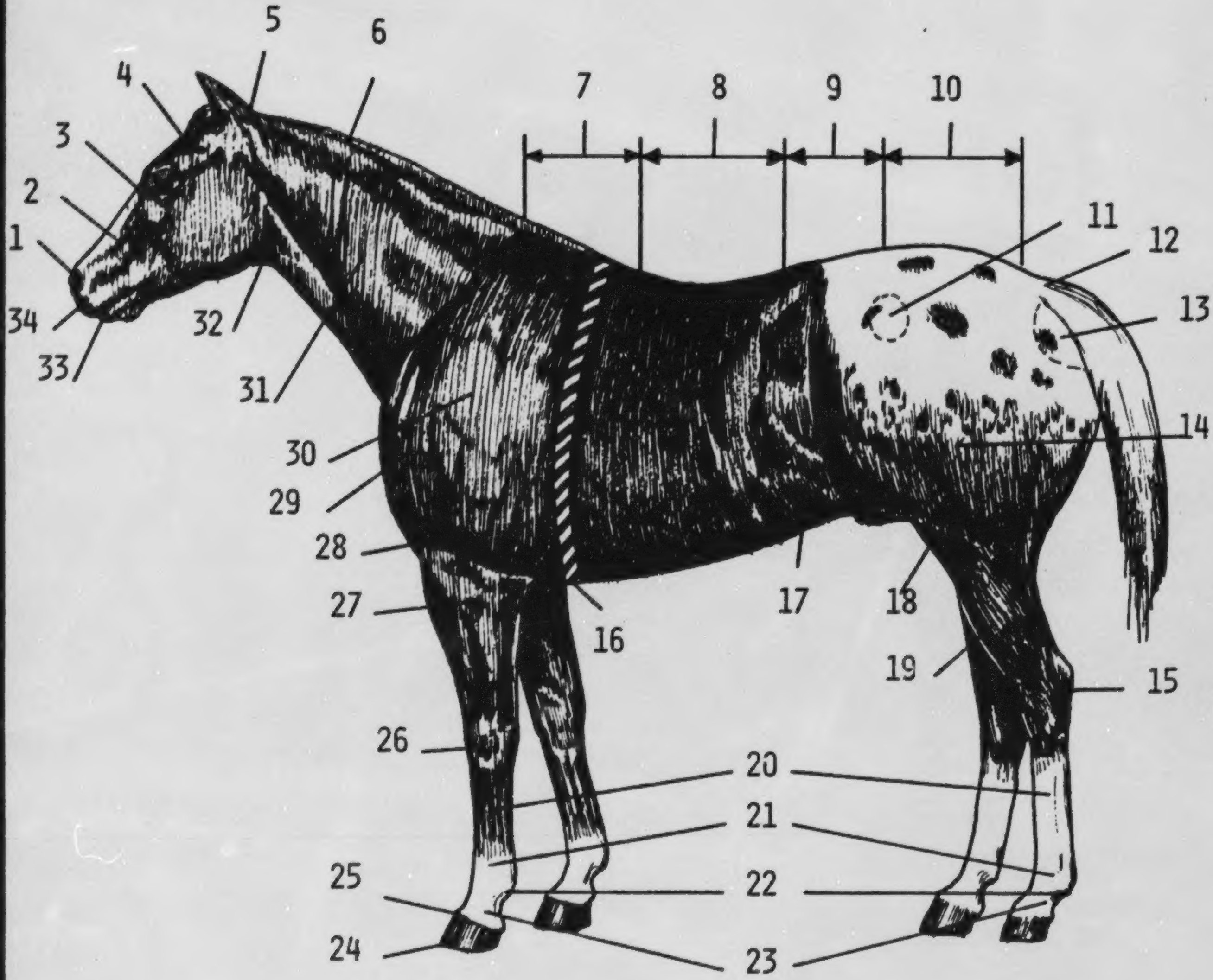

PARTS OF A HORSE

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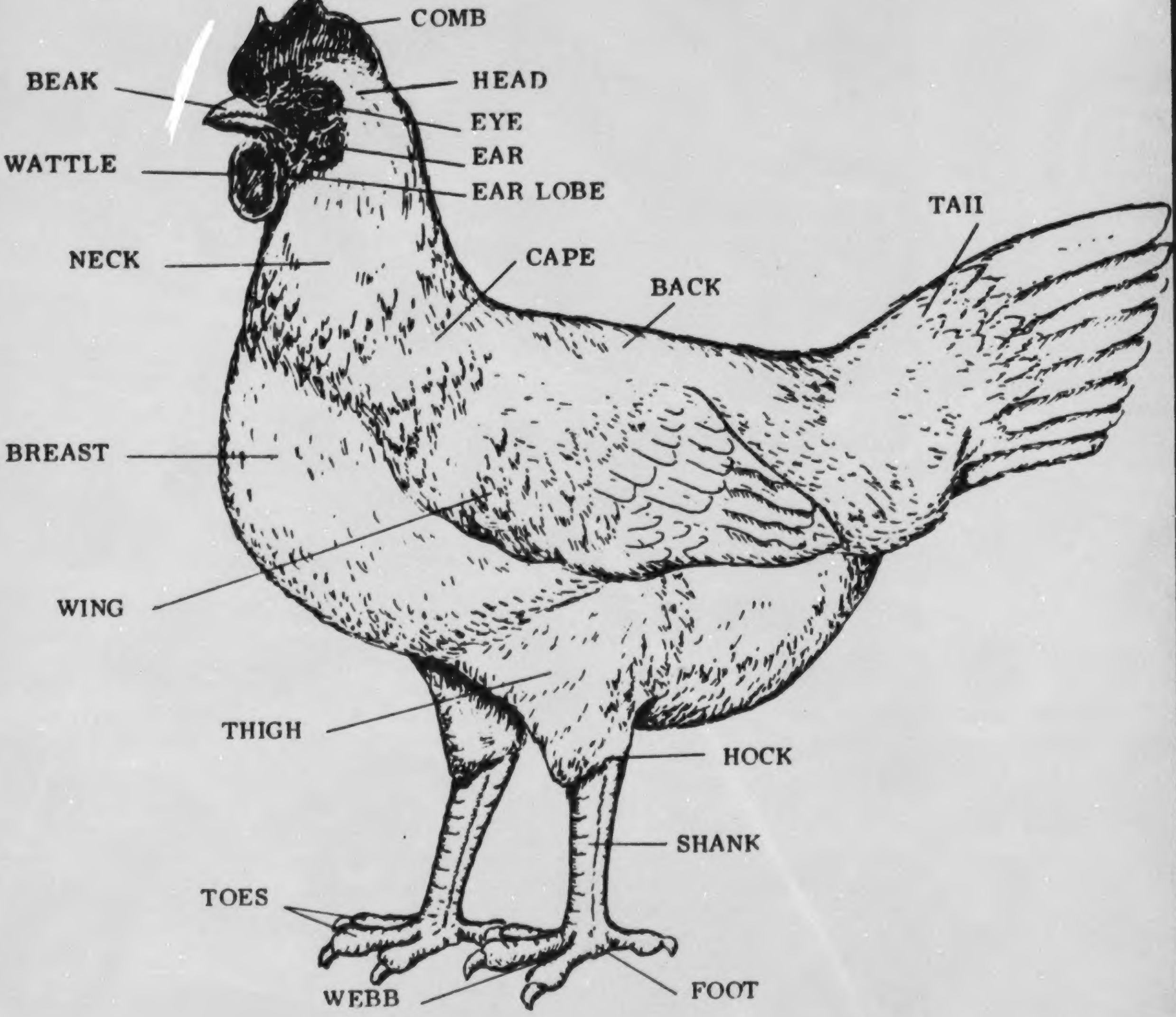
PARTS OF A CHICKEN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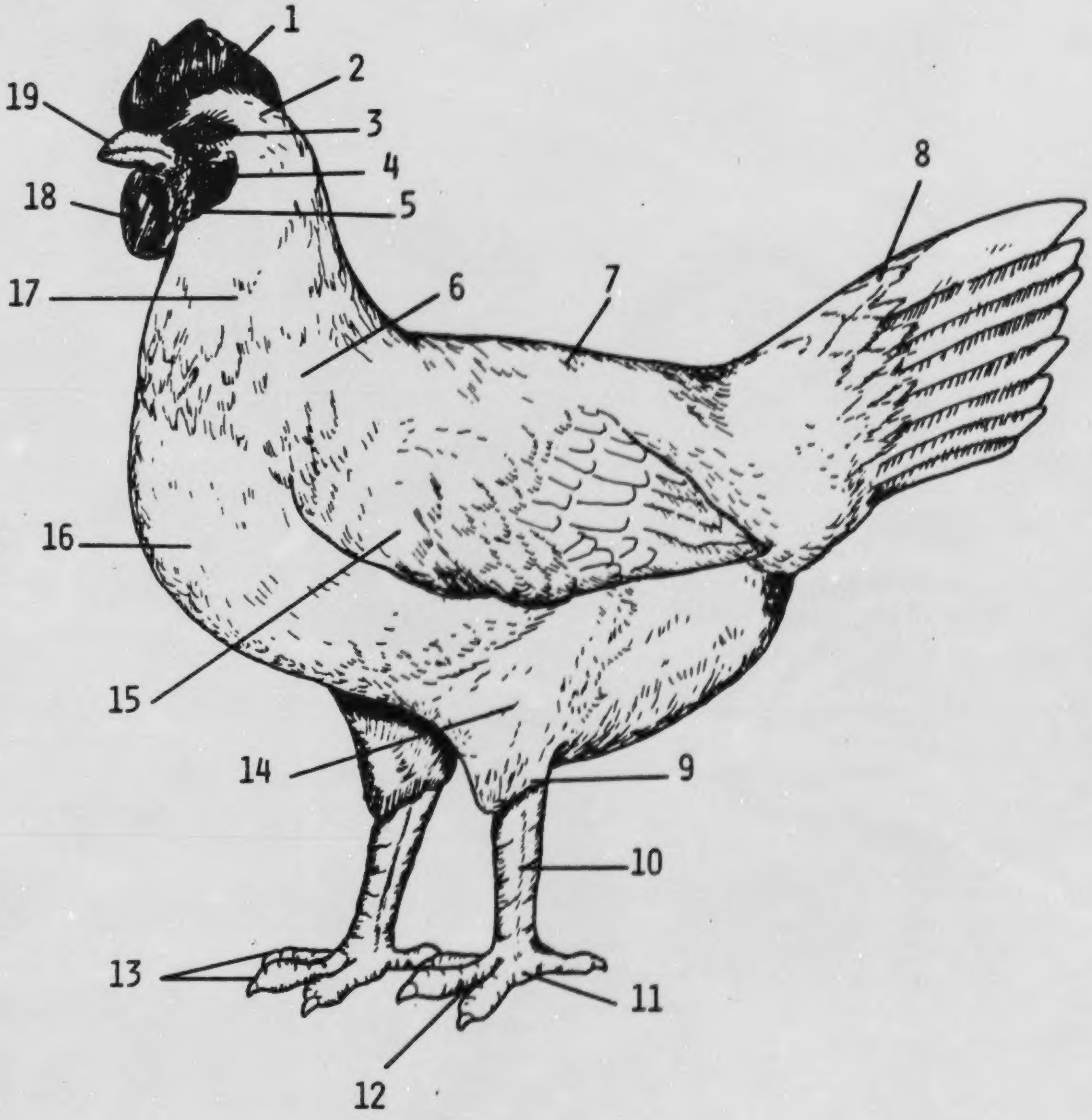
Transparency II-1-F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Handout II-1-F

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 2: Classes and Grades of Livestock and Poultry

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Classify and grade livestock and poultry.

2. Specific:

   a. Define market class and market grade.
   b. Outline the sex classes of livestock and poultry.
   c. List the market classes and grades for meat animals and the USDA grades of meats.
   d. Identify the uses made of market classes and grades.
   e. List the factors determining market grades.
   f.

   g.

   h.

B. Review Teaching Material

1. Bundy, Clarence E., Ronald V. Diggins and Virgil W. Christensen. Livestock and Poultry Production. 4th. Edition, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.

2. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Printers, 1977.

3. LSU Cooperative Extension Service, Agricultural Summary-Louisiana 1980.

C. Special Arrangements

1. Materials

   a. Louisiana and USDA market bulletins
   b. Local newspapers
   c. Transparencies

2. Visit a local meat market

3. Overhead projector

II. Presentation of Lesson

A. Motivation

1. Ask each student to classify pick-up trucks according to characteristics. Consider how the various characteristics of the truck affect its value.

2. Relate this to livestock classes and grades.

B. Content Outline

1. Terms

   a. Market class -- The use to which animals are put (Transparency II-2-A).

   b. Market grade -- A measure of how well the animal fulfills the requirements for the class.

   c. Grading livestock -- The act of sorting, dividing, or designating animals of similar classes and grade (Transparency II-2-A).

   d. Yield grade -- A nationally uniform method of identifying quantity or cutability differences among meat carcasses.

2. Factors determining market classes of livestock

   a. Use selection -- An indication of the purpose to which the animals will be put, e.g., slaughter, feeder, stocker. (Note: Breeding cattle are not assigned market classes.)

   b. Sex -- Refers to the sex condition and expression of secondary sexual characteristics which influence the commercial value of the carcass or the animal's future usefulness.

   c. Age -- The animal's age influences the classification as to live and carcass grade.

   d. Weight -- Used to group animals according to market weights preferred by buyers. Three common weight divisions are the light, medium and heavy (in cattle, hogs and sheep).

3. Sex classes of livestock and poultry (Information sheet II-2-B)

4. Market classes and grades for meat animals and meat (Information sheet II-2-A)

5. Uses of market class and grade

   a. Provides standard vocabulary for market reporting.

   b. Aids in shaping breeding and feeding operations to meet market demands.

   c. Ensures fair dealing when animals are purchased.

   d. Keeps various markets in line with each other.

   e. Ensures that direct buying prices are on an equitable basis with those at the terminal markets.

   f. Provides a producer with a method of selecting the market in which he may secure the best returns.

   g. Provides a basis for compiling important statistical data.

6. Market classes and quality grades of chickens

   a. Market classes (live poultry, dressed poultry, and ready-to-cook)

      1) Broiler or fryer -- A young chicken (under 16 weeks of age) of either sex.

      2) Roaster -- A young chicken (under eight months of age) of either sex.

      3) Capon -- An unsexed male chicken (under 10 months of age).

      4) Stag -- A male chicken (under 10 months of age) with coarse skin and a hardening of the heart bone cartilage.

      5) Hen -- A mature female chicken (more than 10 months old).

      6) Cock or old rooster -- A mature male chicken.

b. Quality grades (See Lesson 6 for more detailed information)

1) A or #1

2) B or #2

3) C or #3

C. Suggested student activities

1. Obtain a livestock marketing report and observe the use of the market classes and grades.

2. Determine the common market procedures for local community.

3. Visit nearest livestock market and determine manner in which classes and grades are used.

4. Determine factors which influence local market supplies and prices.

5. Visit a local meat market (supermarket meat department).

D. Suggested study questions

1. What is a market class of livestock?

2. What is a market grade of livestock?

3. What are the sex classes of cattle?

4. What are the sex classes of swine?

5. What are the sex classes of sheep?

6. What are the sex classes of horses?

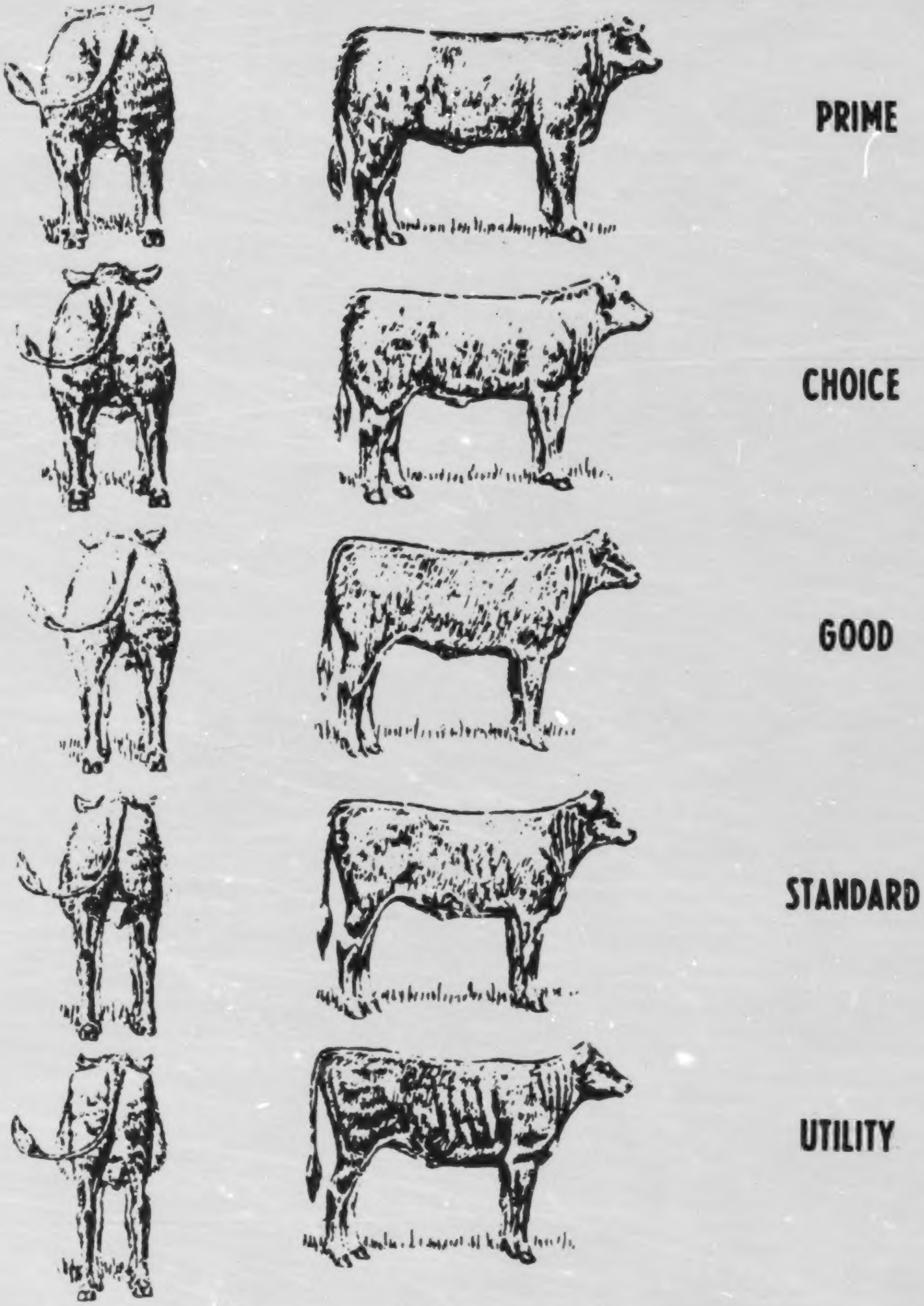
7. What are the sex classes of chickens?

8. What are the market classes of feeder steers?

9. What are the market classes of chickens?

10. What are some uses of market classes and grades?

SLAUGHTER STEERS (U.S. 'QUALITY' GRADES)


PRIME
CHOICE
GOOD
STANDARD
UTILITY

Transparency II-2-A

INFORMATION SHEET II-A

MARKET CLASSES AND GRADES FOR MEAT ANIMALS AND MEAT

Market Group	Class	Grade							
Cattle and calves									
Slaughter cattle....	Steer	Prime	Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Heifer	Prime	Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Cow		Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Bull		Choice	Good		Commercial	Utility	Cutter	Canner
	Stag		Choice	Good		Commercial	Utility	Cutter	Canner
Vealers.............	Steer, heifer, and bull	Prime	Choice	Good	Standard		Utility	Cull	
Slaughter calves....	Steer, heifer, and bull	Prime	Choice	Good	Standard		Utility	Cull	
Feeder and stocker calves and cattle.		FOR FEEDER AND STOCKER CATTLE SEE SUPPLEMENT.							
Beef and veal									
Beef carcasses......	Steer	Prime	Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Heifer	Prime	Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Cow		Choice	Good	Standard	Commercial	Utility	Cutter	Canner
	Bull		Choice	Good		Commercial	Utility	Cutter	Canner
	Stag		Choice	Good		Commercial	Utility	Cutter	Canner
Veal carcasses......	Steer, heifer, and bull	Prime	Choice	Good	Standard		Utility	Cull	
Calf carcasses......	Steer, heifer, and bull	Prime	Choice	Good	Standard		Utility	Cull	
Sheep and lambs									
Slaughter lambs.....	Ram	Prime	Choice	Good			Utility	Cull	
	Ewe	Prime	Choice	Good			Utility	Cull	
Slaughter yearlings.	Wether	Prime	Choice	Good			Utility	Cull	
	Ram	Prime	Choice	Good			Utility	Cull	
	Ewe	Prime	Choice	Good			Utility	Cull	
	Wether	Prime	Choice	Good			Utility	Cull	
Slaughter sheep.....	Ram		Choice	Good			Utility	Cull	
	Ewe		Choice	Good			Utility	Cull	
	Wether		Choice	Good			Utility	Cull	
Feeder lambs........	Ewe	Fancy	Choice	Good		Medium	Common	Inferior	
	Wether	Fancy	Choice	Good		Medium	Common	Inferior	
Feeder yearlings....	Ewe	Fancy	Choice	Good		Medium	Common	Inferior	
	Wether	Fancy	Choice	Good		Medium	Common	Inferior	
Feeder sheep........	Ewe		Choice	Good		Medium	Common	Inferior	
Lamb and mutton									
Lamb carcasses......	All classes	Prime	Choice	Good		Utility	Cull		
Yearling mutton carcasses.........	All classes	Prime	Choice	Good		Utility	Cull		
Mutton carcasses....	All classes		Choice	Good		Utility	Cull		
Hogs									
Slaughter hogs......	Barrow and gilt	US No. 1	US No. 2	US No. 3		Medium	Cull		
	Sow	US No. 1	US No. 2	US No. 3		Medium	Cull		
	Boar				Ungraded				
	Stag				Ungraded				
Slaughter pigs......	All classes		Choice	Good		Medium	Cull		
Feeder and stocker	Barrow and gilt		Choice	Good		Medium	Common		
hogs...............	Sow, boar and stag				Ungraded				
Feeder and stocker pigs..............	All classes		Choice	Good		Medium	Common		
Pork									
Pork carcasses......	Barrow and gilt	US No. 1	US No. 2			Medium	Cull		
	Sow	US No. 1	US No. 2			Medium	Cull		
	Boar				Ungraded				
	Stag	No official grade; tentative grades not in general use.							

INFORMATION SHEET II-2-A (Continued)

MARKET CLASSES AND GRADES FOR MEAT ANIMALS AND MEAT
(Supplement)

MARKET GROUP	CLASS	GRADE		
		Frame Size	Thickness	
Feeder and Stocker Cattle and Calves*	Steer Heifer	Large, Medium, Small	US No 1, US No 2, US No 3	Inferior

*For all Feeder and Stocker Cattle less than 36 months of age.

INFORMATION SHEET II-2-B

SEX CLASSES OF LIVESTOCK AND POULTRY

	Cattle	Hogs	Sheep	Horse	Chicken
An uncastrated male animal of any age.	bull	boar	ram	stallion	rooster or cock
A female animal that has had one or more offspring or that has reached the stage of advanced pregnancy. Barren females which have reached maturity and have developed the predominating physical characteristics peculiar to the species.	cow	sow	ewe	mare	hen
A female animal that has not had offspring or has not reached the advanced stage of pregnancy or developed the mature form of the female of the species.	heifer	gilt	N/A	filly	pullet
A male animal that was castrated at an early age, before reaching sexual maturity and before developing the sexual characteristics of the male of the species.	steer	barrow	wether	gelding	capon
A male animal that was castrated after it had developed the physical characteristics of the male of the species.	stag	stag	buck or stag	N/A	stag

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock and Poultry

LESSON 3: Selecting and Judging Beef Cattle

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Explain the use of selection and judging techniques in selecting beef cattle for type and performance.

2. Specific:

   a. Identify and define new terms.
   b. List and discuss four methods of selection.
   c. Identify desirable and undesirable beef animal characteristics.
   d. Identify the wholesale cuts of beef.
   e. Describe the procedure a judge uses in examining a beef animal.
   f. Participate in selection exercises.
   g.

   h.

   i.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Printers, 1977.

2. Hunsley, Roger, E., W. Malcolm Beeson, and Julius E. Nordby. Livestock Judging, Selection and Evaluation. Danville: Interstate Printers, 1978.

3. Animal Science 2, LSU Cooperative Extension Service, Publication 1764.

4. Parham, A. P. and Stewart H. Fowler. Louisiana Beef Production. LSU Cooperative Extension Service, Publication 1591.

5. Livestock Judging Bulletin, State Department of Education No. 1546.

C. Special Arrangements

1. Materials

    a. Information sheets (wholesale and retail cuts)
    b. Charts of wholesale and retail cuts of beef

2. Field trips to local beef cattle farm and a livestock show.

3. Examine pictures of classes of beef for judging (by observation).

II. Presentation of Lesson

A. Motivation

1. Present two cuts of beef varying in quality. Discuss proportion of lean meat to fat, importance of minimum bone and expected eating quality.

2. Present same cuts of beef prepared and ask several students to taste and make comments regarding tenderness, flavor and juiciness.

3. Discuss the two profitability factors, individuality and performance.

B. Content Outline

1. Terms

   a. Individuality -- The ability of the animal to produce beef for a discriminating market.

   b. Performance -- The ability to reproduce regularly and utilize feed efficiently.

   c. Dam -- The female parent.

   d. Sire -- The male parent.

   e. Heredity -- The potentialities genetically derived from one's ancestors.

   f. Environment -- The complex of climatic and biotic factors that act upon an organism to determine its form and survival.

   g. Bloodline -- The family or family lines of breeding.

   h. Nick -- When the offspring in general is better than its parents.

2. Determining the type of producer (same factors considered by all livestock producers).

   a. Breeder cattle producer -- The production of breeding stock for purebred breeders and commercial cattle producers (Transpareny II-3-R).

   b. Commercial cow-calf producer -- Production of animals from a non-registered herd (Transparency II-3-S).

   c. Slaughter cattle producer -- Production of cattle for slaughter (Transparency II-3-T).

3. Selection of a cattle breed (Transparency II-3-A).

4. Selection of individual animals for breeding. Components to consider are conformation, age, production and pedigree.

a. Conformation -- The body shape or form of an animal. In meat production animals there exists a positive correlation between the conformation of the live animal and the quality of a carcass yield. The beef animal having desirable conformation should yield a large percentage of rib, loin and round. Animals with desirable type or conformation will possess desirable muscling and finish. The forequarters (brisket, plate, belly and flank) should make up as small a percentage of the carcass as possible because they yield the low-priced cuts and constitute the area of greatest waste. (Transparency II-3-V)

When selecting beef animals, one should follow a definite order of inspecting.

Step I -- side view
(observed from 20 ft.)
Step II -- rear view
(observed from 20 ft.)
Step III -- front view
(observed from 20 ft.)
Step IV -- contact step
(close inspection)

1) Comparison of Live Steers (side view)
(Transparency II-3-B)

a) Steer 1
(1) Light framed
(2) Very upstanding
(3) Shallow-bodied
(4) Light in rear quarters
(5) Lacking in balance
(6) Lack of muscling, underfinished

b) Steer 2
(1) Approaches the ideal--exhibits balance and style
(2) Length of body
(3) Long, full loin and rump
(4) Deep bulging hindquarters
(5) Extreme muscle development through arm
(6) Trim in the flanks
(7) Stands on ample legs

c) Steer 3
    (1) Short-bodied steer, short of leg
    (2) Deep-bodied, wasty steer
    (3) Unbalanced
    (4) Heavy-fronted, wasty brisket, rear flank and cod
    (5) Overfinished
    (6) Exhibits average muscling

2) Comparison of Steer Carcasses (side view) (Transparency II-3-C)

a) Steer 1
    (1) Lack of muscling and finish
    (2) Light-framed
    (3) Lacks style and quality

b) Steer 2
    (1) Desirable length of body
    (2) Long, lean loin and rump
    (3) Evidence of heavy muscling through shoulder, loin, and rear quarter
    (4) Deep bulging round
    (5) Cut out a high percentage of the primal cuts (loin, rib, and round)

c) Steer 3
    (1) Demonstrates an unbalanced, heavy-fronted carcass that is too short of body and is wasty in the middle, brisket, and flanks
    (2) Lacks desirable muscling
    (3) Light in the hindquarters
    (4) Overfinished
    (5) Cut out a low percentage of primal cuts

3) Other conformation comparisons (Transparency II-3-D)

a) Comparison of live steers and carcasses (front view) (Transparencies II-3-D&E)

b) Comparison of live steers and carcasses (rear view) (Transparencies II-3-F&G)

c) Comparison of correct with defective front legs (Transparency II-3-H)

d) Comparison of correct with defective hind legs (Transparency II-3-I)

e) Substance of bone and set of legs and feet (Transparency II-3-J)

b. Age as a basis for selecting beef cattle

Age will determine the number of calves a breeding animal can produce and also the class of a slaughter animal (Transparency II-3-K).

c. The pedigree as a basis of selection

1) Using the performance of the ancestors should be the principle factor to consider in the selection of pedigree.

2) If improvement in a trait is due to environment, the heritability of that characteristic will be low. However, if the trait is highly heritable, progress can be made through selection by pedigree. There is a need to know the percentage of change due to heredity (Transparency II-3-L).

d. Production testing as a basis of selection. The most reliable methods of selection include:

1) Individual merit testing (performance testing) -- evaluating and selecting on the basis of the animal's individual merit.

2) Progeny testing -- selecting animals on the merit of their progeny (offspring) (Transparencies II-3-L,M,& N).

5. Market Grades (Transparencies II-3-K&W).

Prime cattle -- The term prime cattle is applied to only a small percentage of feeder steers and heifers. Those grading prime show exceptional smoothness and body conformation with a high degree of finish.

Choice cattle -- Choice is the highest practical grade of market cattle. They are superior in conformation, natural finish and quality. They are cattle with long bodies, moderate depth, well turned tops, long rumps, and trim briskets and shanks. Most meat cuts sold in supermarkets are from choice market cattle.

Good cattle -- Cattle show less muscling and smoothness than the higher grades. They lack development of the more valuable cuts such as the back, loin, and hind- quarters.

Standard cattle -- Standard cattle show less quality in muscling and smoothness. Their hip bones are prominent, and the animals are somewhat narrow over the back and light in the hindquarters.

Utility cattle -- Utility cattle are unthrifty, thinly muscled, narrow, and shallow bodied.

6. Live Animal Judging (Transparency II-3-V)

The ability to judge livestock is a skill that the livestock producer is constantly using and one that is essential for continuous, successful production. Livestock judging is an art or science that can be acquired by the individual through study and practice.

The ability to recognize high quality, efficient animals offers the following advantages to the livestock producer: (1) It will increase interest in animals and agriculture; (2) It will develop an appreciation of the importance of livestock production and its relationship to the total production of food;

(3) It will improve the animals and improve production efficiency; and (4) It will assist the producer in making accurate observations.

The information contained in this topic pertains to the visual appraisal of animals. The prospective livestock producer should keep in mind that visual appraisal is only an estimate. A more accurate appraisal can be made when production records are available.

7. A System of Judging

In order to become a good livestock judge, a person must follow an orderly system of observing the animals in the class. Some authorities recommend a system composed of four steps, with a certain part of the animal being observed in each step. The animal is observed from a distance of 15 to 20 feet in the first three steps. The animals are examined at a closer range in the fourth step, commonly called the contact step. Finish and other factors are evaluated in this step.

The following factors listed in each step pertain to the judging of steers. The same system can be used in judging other classes of livestock.

Transparency II-3-O

The animals should be observed from the side in Step 1. Top and bottom lines, levelness of rump, muscling in the arm and forearm, trimness in middle, length and depth of body, and length of leg are some of the factors that should be considered in this step.

Steer #1 in the transparency is a correctly finished steer with moderate length and depth of body. It has a long, full rump and is muscular in the arm and forearm. It is trim in the brisket, flank, cod, and middle.

Steer #2 is an overfinished steer with average muscling. It is too deep in its body, and its legs are too short. This steer is wasty in the middle and has a heavy, wasty brisket.

Steer #3 is underfinished, long legged, and shallow bodied. It has a drooping rump and lacks overall muscling.

Transparency II-3-P

In Step 2 the animals are observed from the rear; the animals' width, depth of twist, depth of round, heart girth, turn over the top, and uniformness of width in the back, loin, and rump are noted.

Attention is called to the width at the pins and the length from the pins to the twist in steer #1. It has a uniformly wide, thick back with a correct turn over the top.

Steer #2 tapers from the top of the back to the twist and lacks length of round. It has a wide, flat, square-cornered curved top, which indicates excessive fat over the crops and along the edges of the loin.

Steer #3 has a narrow, flat, tapered round and is narrow at the pins. It has a prominent tailhead and hooks and a triangular-shaped curved back.

Transparency II-3-Q

In Step 3 the animals are observed from the front. Characteristics to observe are the width between the legs, muscling in the shoulders, the animals' heads, and their substance and soundness.

As is illustrated in the transparency, steer #1 is a heavy-boned steer with wide front legs. It is trim in the brisket but has enough fullness to indicate quality.

Steer #2 lacks width between the legs and has only average bone development. The excessively heavy, full brisket is very much in evidence. This is an indication of a high degree of fat and a lack of muscling.

The poorly-muscled steer #3 is narrow between the legs, light in bone development, and lacks enough fullness of brisket to grade above USDA Good.

In Step 4, it is determined if the observations in the first three steps were correct. The animals should be felt to determine smoothness and amount of covering.

A beef animal starts putting finish on in the area of the forerib first. There will be evidence of finish from the forerib to the rump on a properly finished animal. The prospective judge should use one hand in evaluating the smoothness and amount of finish on a beef animal. The other hand is moved over the animals' bodies in the areas of the crops, back, fore and hind ribs, loin, and rump. After feeling an animal in this order, an experienced judge will know the degree and evenness of finish and firmness of covering. This procedure should be followed each time one judges.

Rules in Judging

Usually there are a number of students involved in a judging contest. Remarks made by other participants should be disregarded. Judging is sound reasoning, and a student should not follow hunches or try to "play" the official judge's decision.

The following should assist one in evaluating and placing a class of livestock:

a. The following points should be considered before placing the class:

   1. For what purpose is the class being judged?

   2. What are the outstanding characteristics which make an animal valuable for that purpose?

   3. How do the animals compare with the ideal?

   4. In what order would you select the animals if you were buying them?

b. Each class should be judged individually and according to its purpose and not by the standards of a previous class. Each animal should be observed carefully and objectively; the animals should be seen as they are and not as one would like to see them.

c. The class should be analyzed. A properly analyzed class reduces the number of decisions to be made by a judge. If possible, the animals should be divided into groups. Ways in which animals can usually be grouped are as a bottom pair; a top pair; a top and three bottoms; three tops and a bottom; and a top, a bottom, and a middle pair.

d. The class should be placed through a process of elimination and brief, accurate notations should be made.

e. The first impression is nearly always right.

f. If the student becomes rattled, he should stop, back off from the class, and think. He should ask himself the questions 1, 2, 3, and 4 under rule a; and

g. The student should go over the class again to see if he used sound reasoning in making his judgment.

8. Factors to Consider in Judging Livestock

Beef cattle are listed first because they are the easiest class of animals to judge. They can be trained to stand and lead, they have greated size, and their hair does not usually mask their shape.

Prior to starting the judging exercises, the student should learn the more common descriptive cattle terms and understand the meaning of each. These terms are listed below:

Market Cattle Terms(Transparency II-3-U)

a. More beefiness or muscling -- in the regions of the high-priced cuts (loin, rump, and round).

b. Over-finished -- too much fat over the 12th rib as indicated by a wasty brisket, full cod, full rear flank, and patchy tail setting.

c. More correct finish -- over the back and ribs (a number of factors affect correctness of finish; therefore, a specific amount of fat covering over the 12th rib cannot be stated).

HIGHER OR LOWER GRADE

d. More uniform finish -- uniformness of finish affects quality and dressing percentage - a higher or lower dressing percentage. The more finish, the lower the yield grade).

e. Wasty middled -- bulging middle (lowers dressing percentage).

f. Dress higher or lower -- a higher or lower dressing percentage.

g. Will yield -- a higher percentage of preferred steak and roast cuts (loin, rib, round, rump, and chuck).

h. Will hang up -- a meatier, more desirable carcass and less fat trim; a more valuable carcass.

Market and Breeding Cattle Terms

a. Terms that describe muscling are:

1) Thicker, more muscular round;
2) Thicker through the middle and lower round;
3) Thicker through the stifle;
4) More correct turn of top;
5) Wider loin;
6) More muscular shoulder;
7) Stands with more width in front and behind;
8) Walks with more width between front and hind legs;
9) Heavier bone.

b. Stronger-topped -- a stronger back.

c. Squarer-rumped -- full in the rump.

d. Longer rump -- longer from hooks to pins.

e. More spring of rib and deeper heart girth -- indicates more constitution.

f. Smoother-fleshed -- an animal with smooth fleshing qualities.

g. Beefier heavier-quartered -- more lean and muscle in the hindquarters.

h. Terms used to describe quality and refinement are:

1) Finer hair coat;
2) Thinner hide;
3) More refined head.

i. More correct in depth of body -- animal with ideal depth.

j. Terms that describe sex character are:

   1) A well-developed udder (female);
   2) Normal testicle development (male).

The Cattle Judging Blank should be used the first few times a student judges market animals. The card will prevent his overlooking some of the important factors he should consider.

C. Suggested Student Activities

1. Write breed associations for practice judging classes.
2. Participate in a judging contest (arranged by teacher for class).
3. Construct a drawing of wholesale cuts and label parts.
4. Locate and list the important identifying factors of actual pedigrees.
5. Secure (from Extension or USDA) current information regarding production testing in Louisiana.
6. Orally describe the qualities and techniques of an effective judge.

D. Suggested Study Questions

1. What are the three main divisions of the beef cattle industry?
2. What are four things that should be considered in selecting animals for breeding purposes?
3. Define pedigree.
4. Define conformation.
5. Describe the characteristics of an ideal beef type animal according to conformation.
6. How can a pedigree be used to increase production in a herd?

7. What is the most reliable method of selecting for production?

8. What is progeny testing?

9. Describe a procedure or system a judge uses in examining a beef animal.

10. What are the wholesale cuts of beef?

11. Which wholesale cuts of beef are the most valuable?

12. How does selection and judging of beef cattle improve production in a herd?

INFORMATION SHEET II-3-A
MARKET CATTLE JUDGING

General Appearance

Type. Thick, muscular throughout, long-bodied, long rumped, desirable spring of ribs
Size for age. Large, early-maturing
Symmetry. Straight top and bottom lines; trim brisket; stands squarely

Conformation

Head -- not too large or too small for size of body; well carried; medium length to face; wide muzzle; broad forehead; medium-sized ears
Neck -- medium length and thickness, blending smoothly with the shoulder; tapering evenly and uniformly from shoulder to head; light crest and clean throat
Shoulder vein -- full and smooth
Brisket -- wide, full, neat and trim, light dewlap
Chest and heart girth -- wide, full, and medium deep; foreflank trim
Crops -- neat, and medium full
Back -- straight, long, narrower than round and shoulders, uniform in width
Loin -- level, thick, and muscular; uniformly finished
Ribs -- widely arched, long
Flanks -- trim and neat
Hooks -- smooth, uniformly finished
Rump -- broad, long, level, straight, square; smooth tailhead; free from patchiness
Thighs or rounds -- deep, full, thick, broad, muscular
Twist -- not overly finished, medium depth
Legs -- straight, set squarely, wide apart; full arm, good bone or substance

Finish

Covering -- correctly finished; trim and free of waste in brisket and flank; smooth, uniformly covered, free from patchiness
Shoulder vein -- medium full
Brisket -- trim
Shoulders, crops, back ribs, loin, rump, and hooks -- uniformly finished, not more than 0.6 inches of finish at the 12th rib
Flanks -- trim, free of excess finish
Pinbones and tailhead -- smooth, and uniformly finished
Thighs and twist -- medium depth, not excessively finished

INFORMATION SHEET II-3-A (Cont'd)

Quality

- Features -- refined head, neck, ears; smoothly made
- Hair -- fine, soft, silky
- Skin -- loose, pliable, mellow, thin to medium thickness not excess throat or dewlap
- Bone -- clean, smooth, medium sized; small horn or neat poll; slim tail; shoulder blades, hooks and tailhead not prominent
- Flesh -- smooth, firm; free from rolls and patchiness

MARKET CATTLE JUDGING INFORMATION SHEET
II-3-B

STEERS -- Muscling, finish, and dressing percentage are the three major factors to consider in judging steers. These factors will determine the market value of the animal. Additional factors--growth rate, age, quality, correct set of legs and feet, and a desirable head shape--should also be considered if all the animals in the class are equal in muscling and finish.

Muscling - in an animal is indicated by its conformation. To contribute to beef production, the animal's conformation must increase production efficiency and/or improve the yield and/or quality of meat. Overall thickness, fullness of muscling, and muscular development in relation to skeletal size are factors considered in determining muscling.

Finish - is a major factor affecting carcass yields of retail cuts, meat quality, and dressing percentage. Finish (fat) and marbling contribute to the juiciness, flavor, and palatability of the meat. The distribution and degree of finish are factors considered in determining finish. The brisket, flank, twist, and cod or udder are the areas indicative of the degree of finish.

The dressing percentage is affected by the amount of fill, degree of fatness, and the weight of "dress off" items (hide, head, and shanks). Hence, a trim middle, light hide, and the amount of finish are the major factors influencing dressing percentage. A high dressing percentage due to excessive finish is not advantageous.

A slaughter animal which is muscular and properly finished can yield a carcass worth $50.00 more than an overfinished, average muscled animal of the same weight.

BREEDING BEEF ANIMALS -- Beef breeding cattle are very similar to fat steers in general appearance, conformation, and quality; however, breed type, sex characteristics and temperament; substance; and feet, legs, and action are additional factors that should be considered when judging breeding classes.

Breed Type is characterized by color patterns and other characteristics which distinguish one breed from another.

INFORMATION SHEET II-3-B (Cont'd)

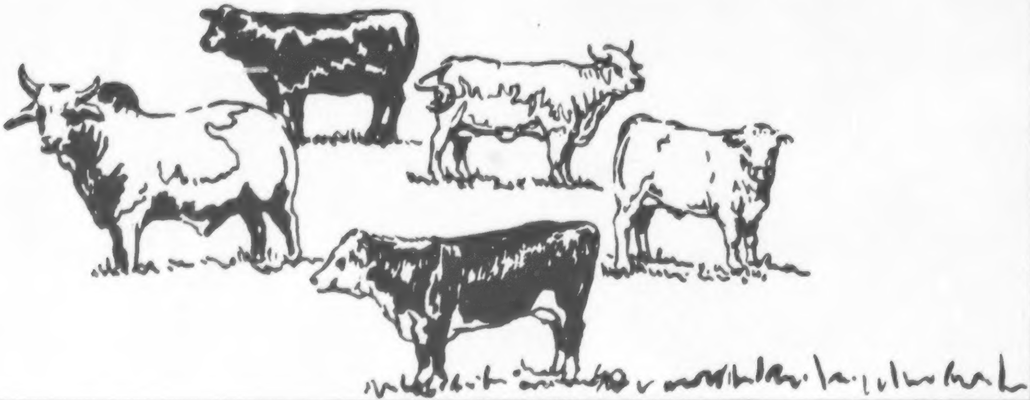
Sex Characteristics and Temperament are evident in a bull by his overall masculinity, shoulders (thick, heavy muscled crest, thick on top of the neck), hair color (thick, glossy, wavy, dark colored on extremities and top line), testes (balanced, in proportion to overall size), head (masculine coarse hair), and aggressiveness. A cow with ideal sex characteristics and temperament is gentle and calm. Her head should have a feminine look and be covered with fine, smooth hair. The dewlap and brisket are clean, and the distance between hip bone and pin bone is long.

Substance is indicated by ample bone and heavy muscling.

The feet, legs, and action of a breeding animal are very important. The breeding animal's feet should be normal, and it should stand on straight legs. Their action should be free and easy.

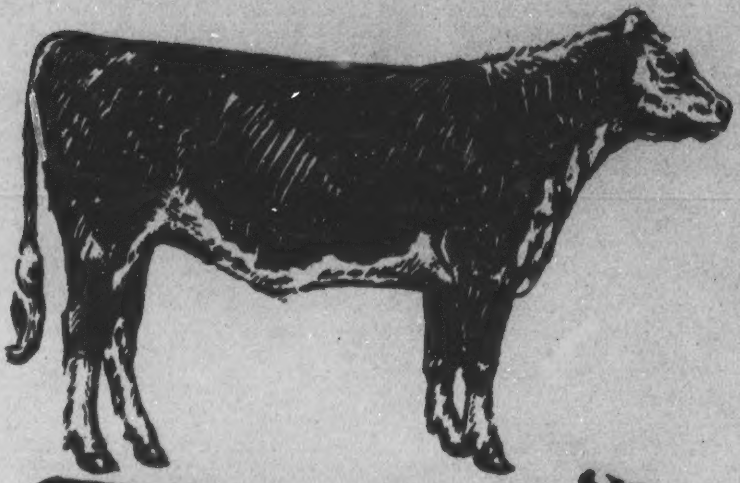
FACTORS TO CONSIDER WHEN SELECTING A BREED OF CATTLE

1. PERSONAL PREFERENCE
2. AVAILABILITY OF BREED
3. ENVIRONMENTAL CONDITIONS
4. DEMANDS FOR THE BREED
5. COST OF ESTABLISHING THE HERD

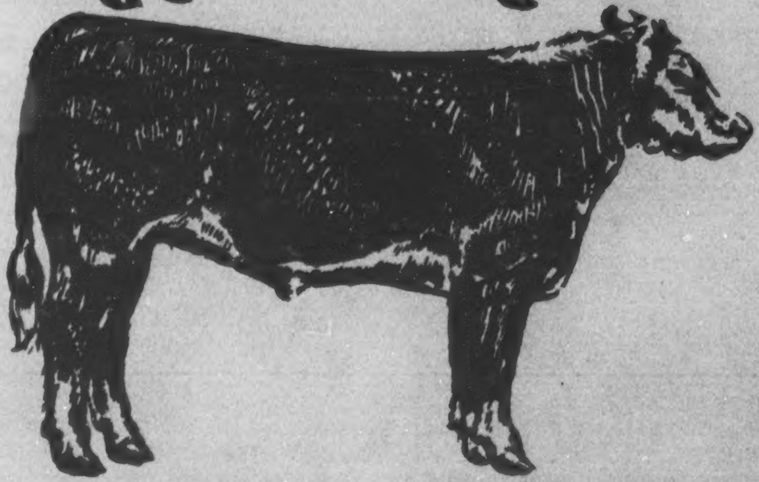


Transparency II-3-A,

COMPARISON OF LIVE STEERS
(SIDE VIEW)



STEER 1



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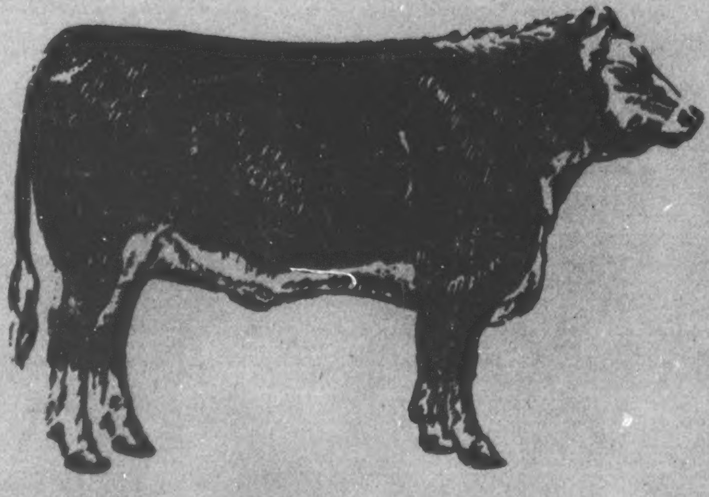
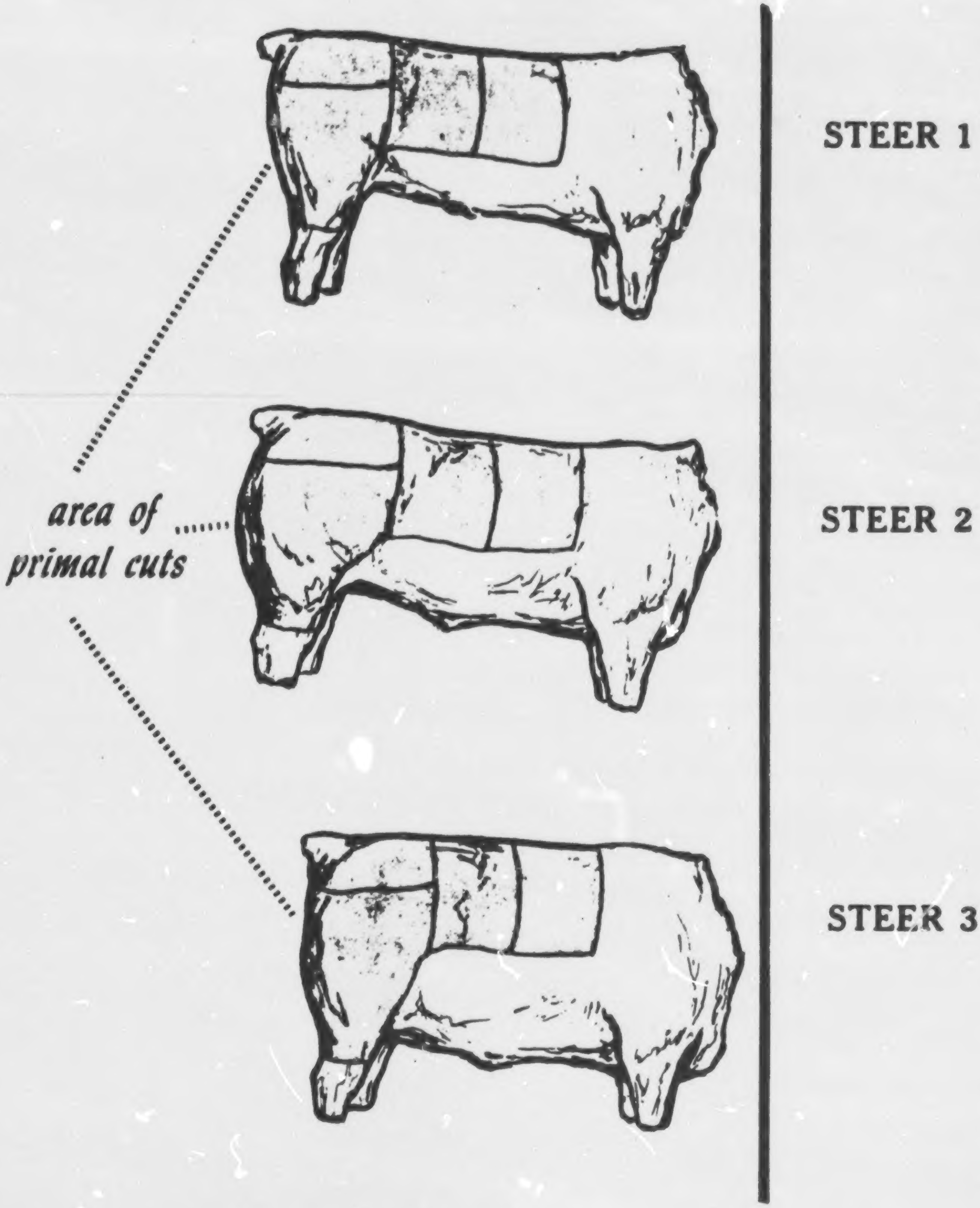


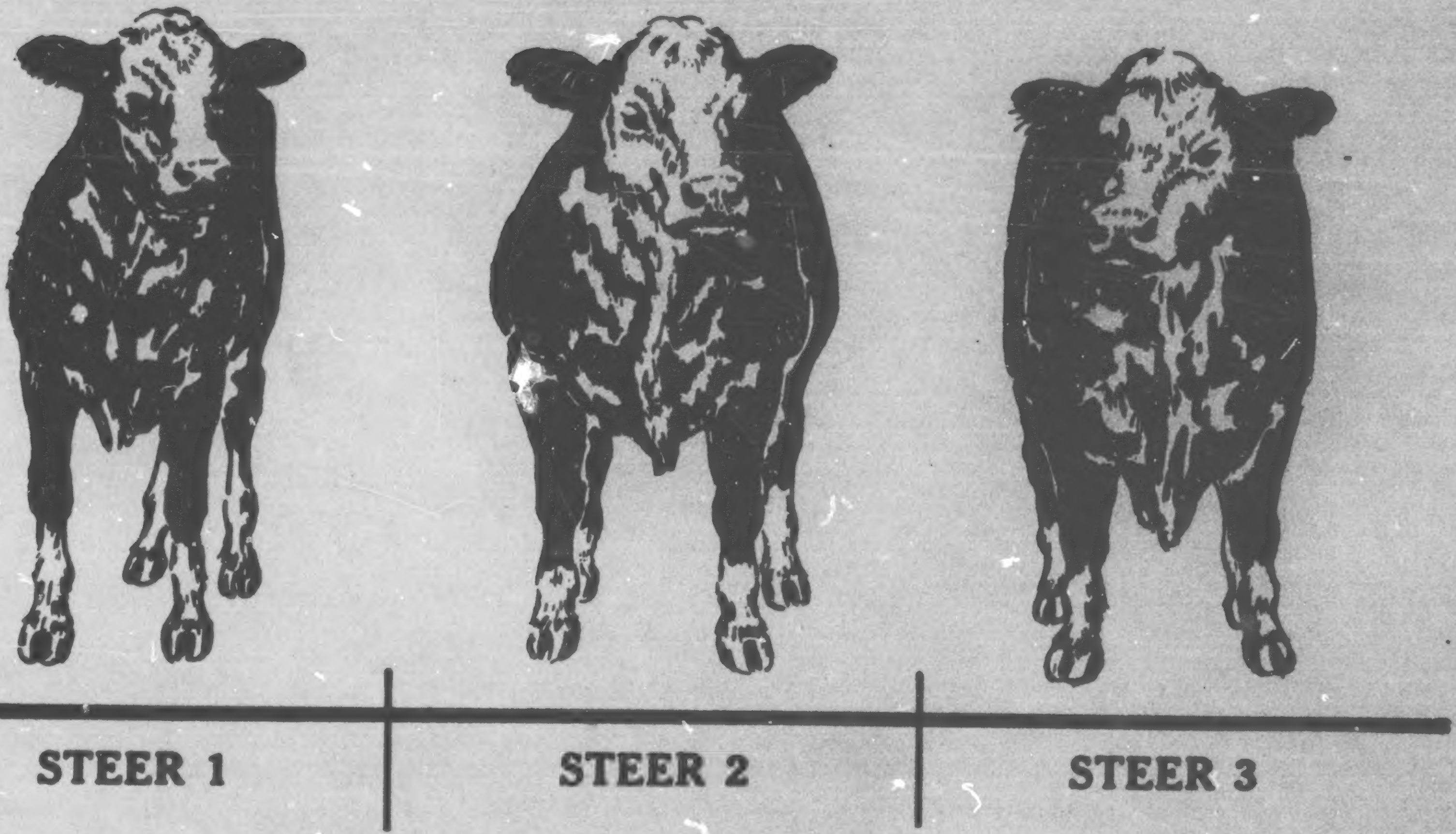
STEER 3

COMPARISON OF STEER CARCASSES
(SIDE VIEW)


STEER 1
area of primal cuts
STEER 2
STEER 3

Transparency II-3-C

COMPARISON OF LIVE STEERS
(FRONT VIEW)



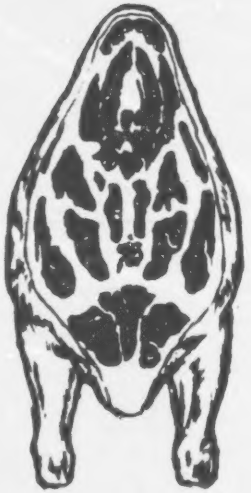
STEER 1

STEER 2

STEER 3

Transparency II-3-D

CROSS SECTION OF STEER CARCASSES
(FRONT VIEW)



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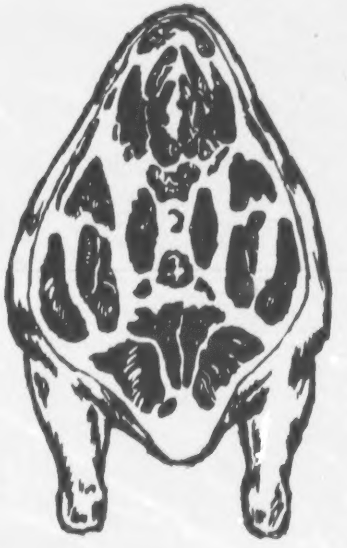
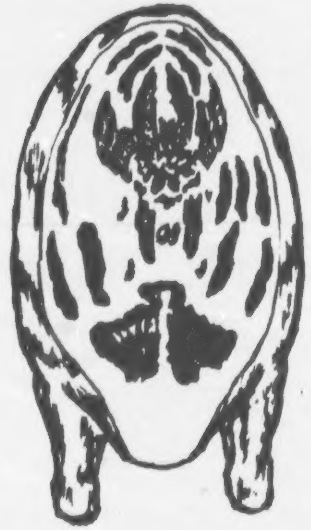


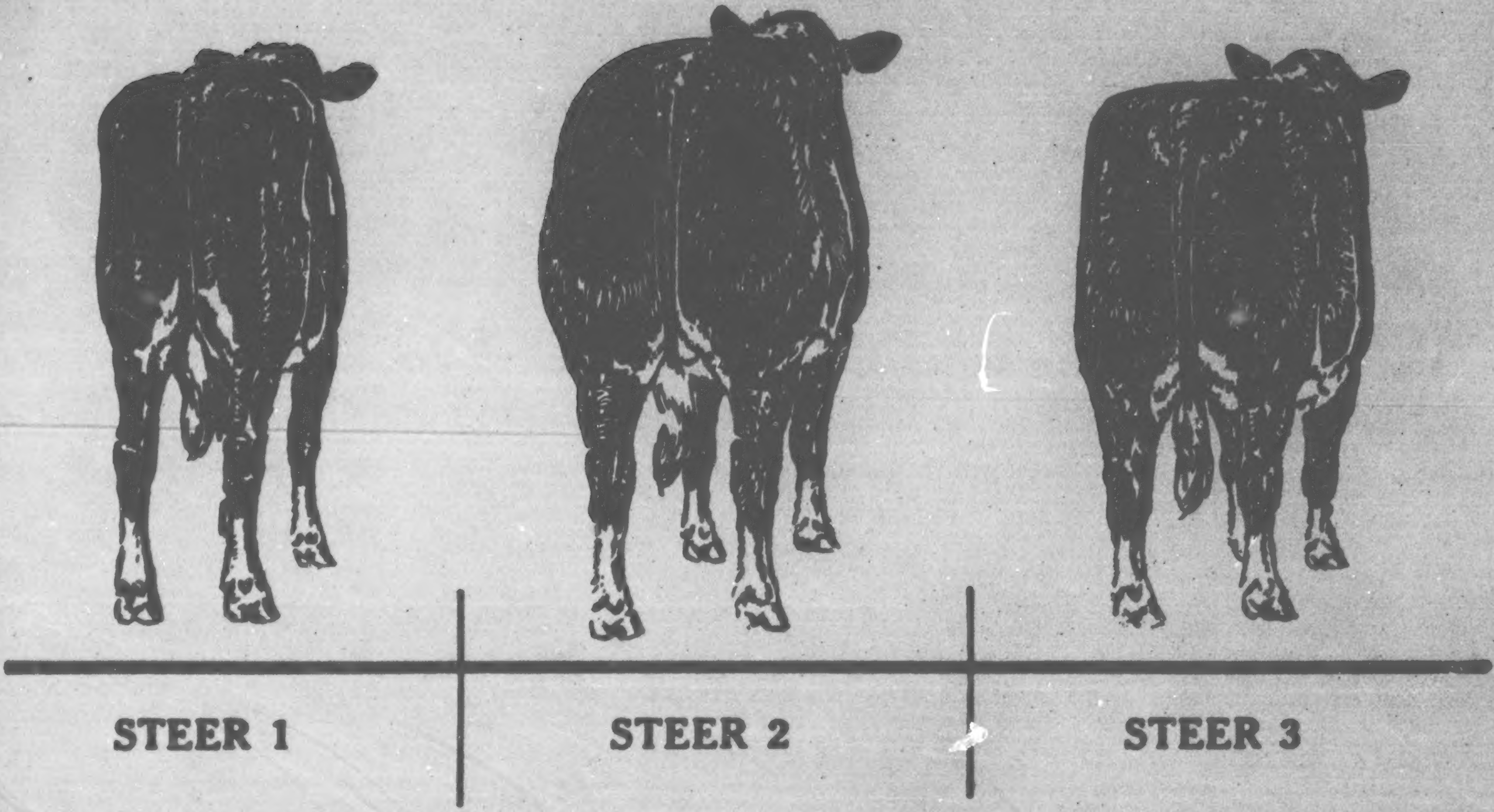
STEER 2



STEER 3

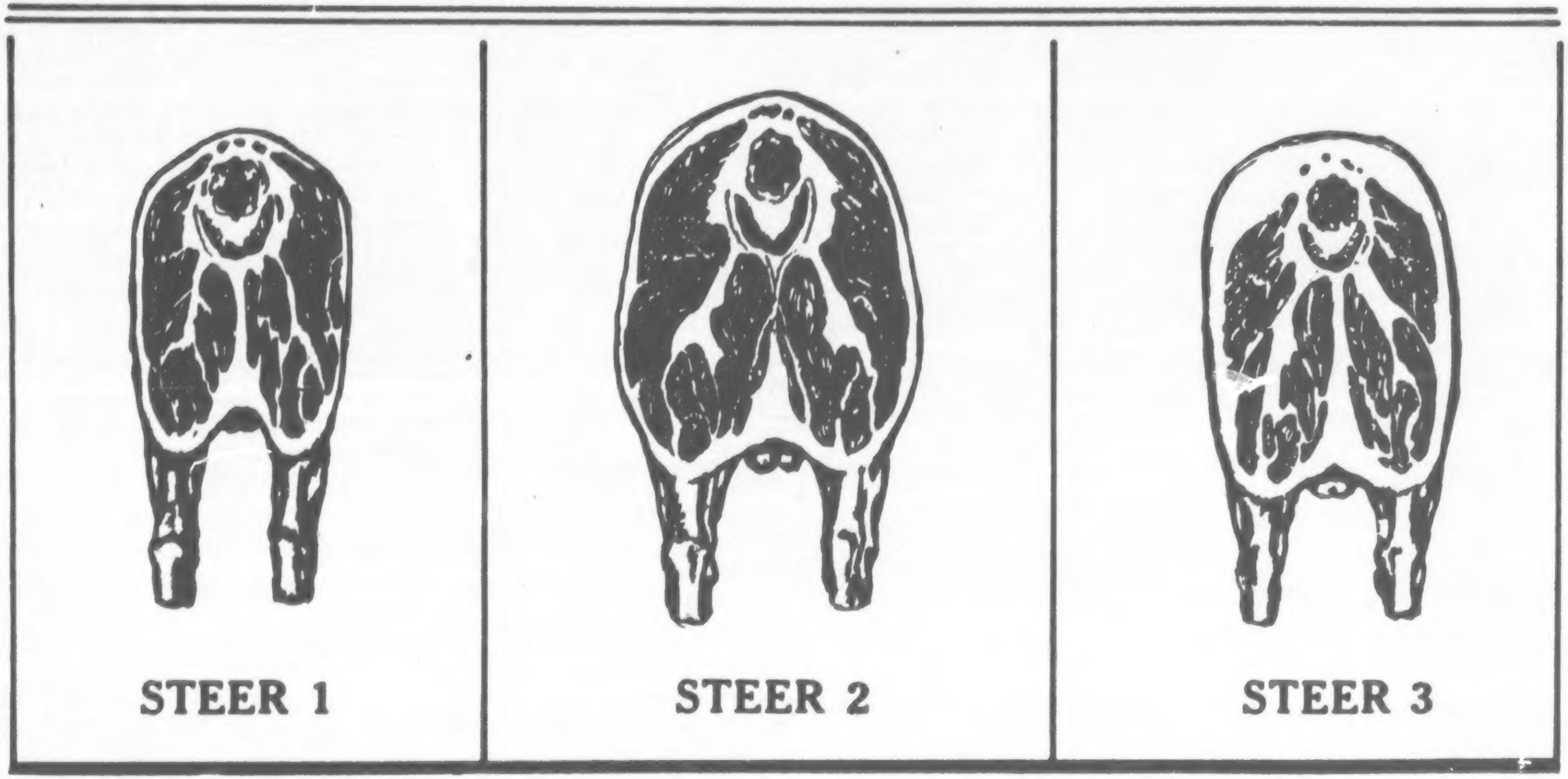
Transparency II-3-E

COMPARISON OF LIVE STEERS
(REAR VIEW)


STEER 1
STEER 2
STEER 3

Transparency 11-3-F

CROSS SECTION OF STEER CARCASSES
(REAR VIEW)



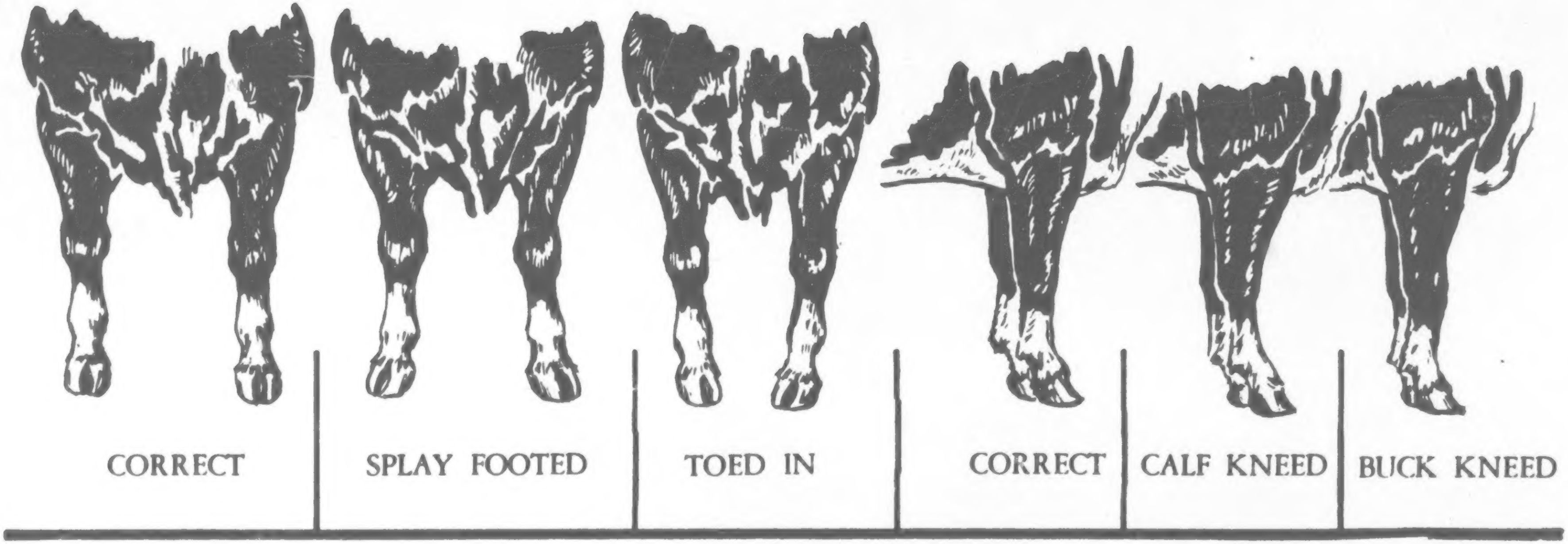
STEER 1

STEER 2

STEER 3

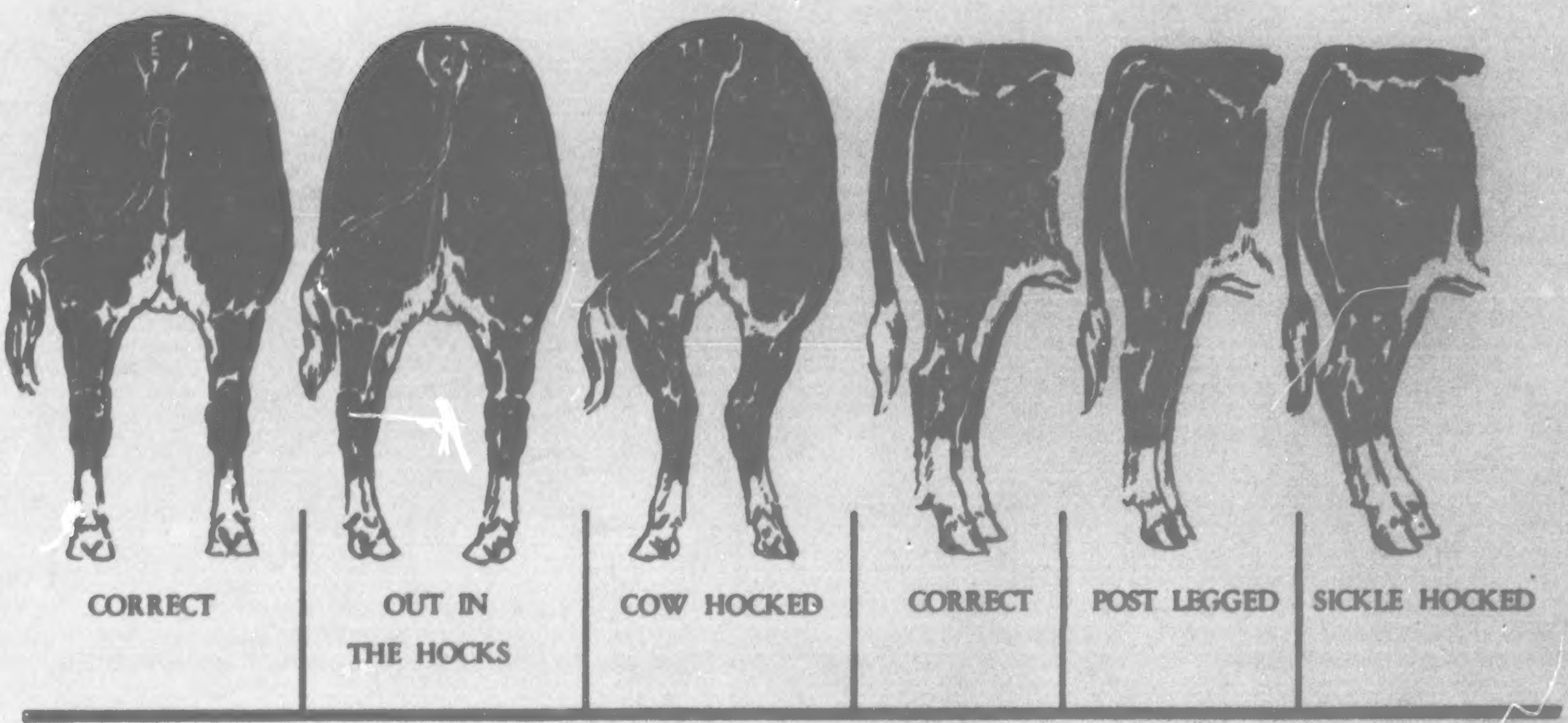
Transparency II-3-G

COMPARISON OF CORRECT WITH DEFECTIVE FRONT LEGS


CORRECT
SPLAY FOOTED
TOED IN
CORRECT
CALF KNEED
BUCK KNEED

Transparency II-3-H

COMPARISON OF CORRECT WITH DEFECTIVE HIND LEGS


CORRECT
OUT IN THE HOCKS
COW HOCKED
CORRECT
POST LEGGED
SICKLE HOCKED

Transparency II-3-1

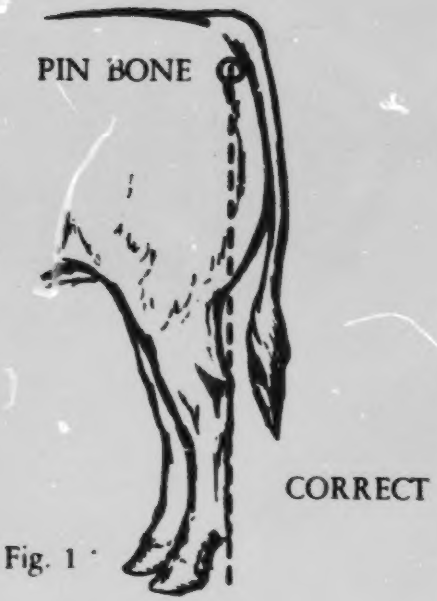

PIN BONE
CORRECT

Fig. 1

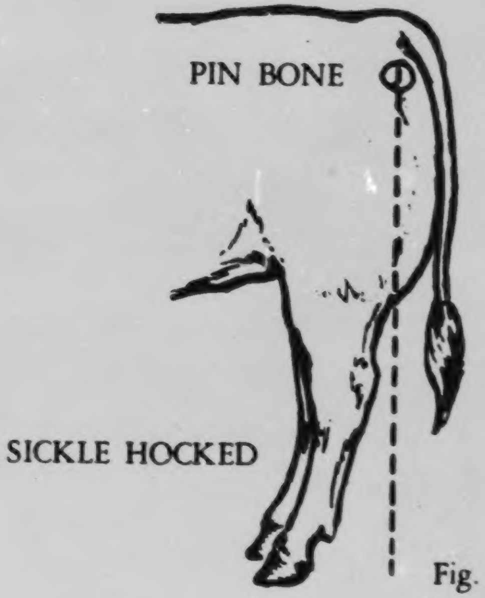

PIN BONE
SICKLE HOCKED

Fig. 2

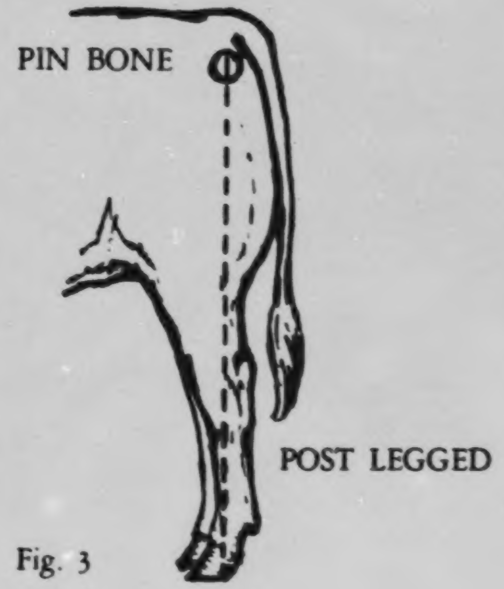

PIN BONE
POST LEGGED

Fig. 3

SET OF LEGS AND FEET

Transparency II-3-J

CLASSIFICATION OF CATTLE BASED ON SEX

- STEERS
- HEIFERS
- HEIFERETTES
- COWS
- BULLS
- STAGS

SLAUGHTER CATTLE GRADES

- PRIME
- CHOICE
- GOOD
- STANDARD
- COMMERCIAL
- UTILITY
- CUTTER
- CANNER

CLASSIFICATION OF CATTLE ACCORDING TO AGE

- CALVES
- YEARLINGS
- TWO-YEAR-OLDS
- COWS
- BULLS
- STAGS

Transparency II-3-K

HERITABILITY ESTIMATES FOR BEEF CATTLE CHARACTERS

CHARACTER	APPROXIMATE HERITABILITY OF CHARACTER IN PERCENT
BIRTH WT.	45%
WEANING WT.	26%
WEANING CONFORMATION SCORE	32%
DAILY RATE OF GAIN FROM WEANING TO MARKETING	46%
EFFICIENCY OF FEED UTILIZATION	39%
ON-FOOT GRADE AT SLAUGHTER TIME	38%
CARCASS GRADE	39%
AREA OF RIB EYE	70%
REPRODUCTIVE PERFORMANCE	25–30%
COW MATERNAL ABILITY (MOTHERING ABILITY AND MILK PRODUCTION)	30%
TENDERNESS	50%
FAT THICKNESS	32%
CARCASS YIELD	35%
YIELD OF RETAIL CUTS	35%

Transparency II-3-L

PRODUCTION RECORD FORMS

CALF & YEARLING WEIGHTS & GRADES RECORD

Sire	Dam		Calving Record			
Herd Identity Number		Age of Dam	Calf Number	Sex	Date Calved	Birth Weight

*To compute the adjusted 205 day weaning weight, apply the formula:

$$\frac{\text{actual weight} - 70}{\text{age in days}} \times 205 + 70 = 205 \text{ day weight}$$

then correct the adjusted weight for the age of the dam according to the following table:

Weaning Record				
Weaning Weight	Age In Days	*Adjusted 205 Day Weight	Weight Per Day of Age	Weight Ratio or Grade

Percent to be added to calf weights after adjusting for age

Age of dam	Percent to be added
2	15
3	10
4	5
5-10	none
11 and older	5

Yearling Record				
Age In Days	Yearling Weight	**Adjusted 365 Day Weight	Weight Per Day of Age	Weight Ratio or Grade

**To compute the adjusted 365 day weight, apply the formula:

$$\frac{\text{final weight} - \text{actual weaning weight}}{\text{number of days between weights}} \times 160 + 205 \text{ day adjusted weaning weight} = \text{adjusted } 365 \text{ day weight}$$

Transparency II-3-M

PRODUCTION RECORD FORMS

SIRE'S ANNUAL PRODUCTION RECORD

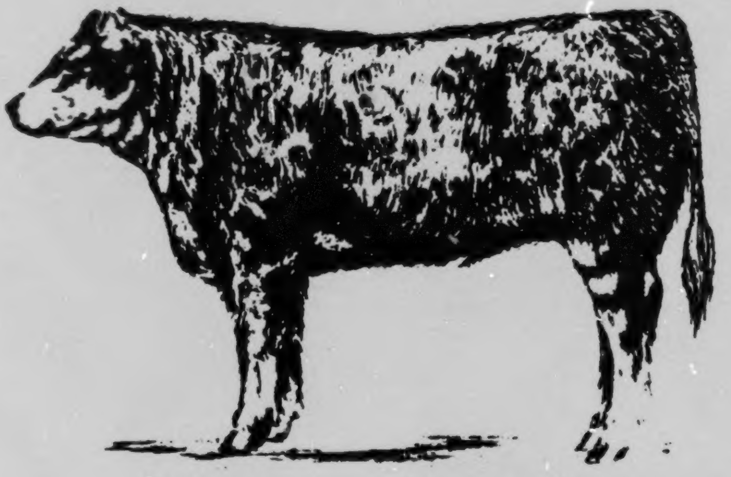
Sire's Herd Identity Number	Calf Number	Sex	205 Day Adjusted Weight	Weight Ratio	Grade	365 Day Adjusted Weight	Weight Ratio	Grade	Replacements	Remarks

LIFETIME PRODUCTION RECORD OF DAM

Herd Identity Number	Year of Birth	Average Total Production at Weaning				Production Index	Replacements	Remarks
		Number of Calves	Adjusted Weaning wt.	Weight Ratio	Grade			

SIDE VIEW OF THREE STEERS

NO. 1



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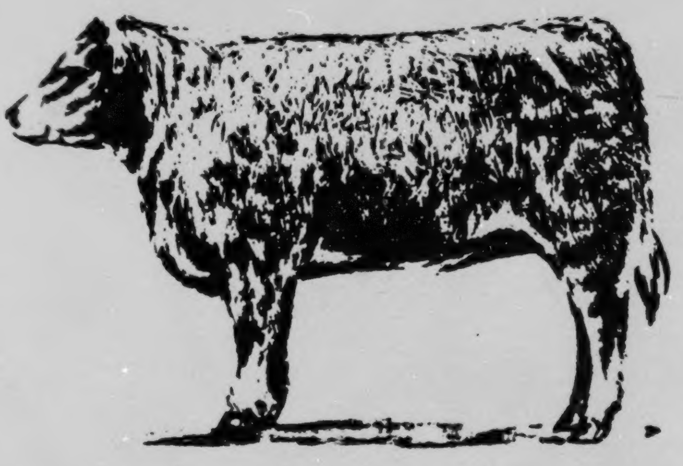

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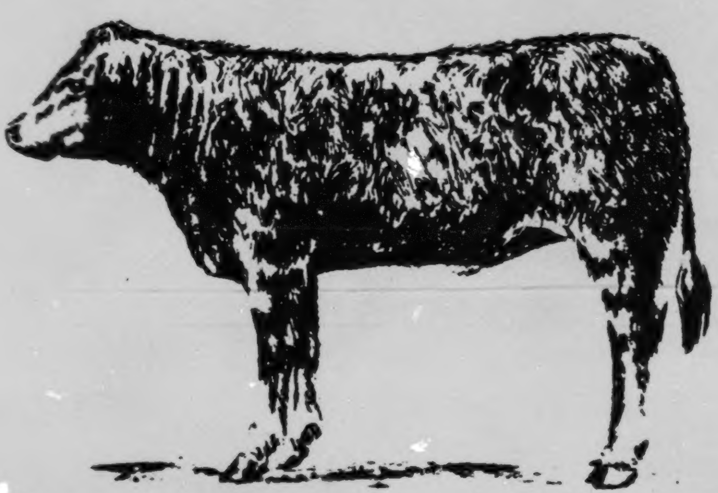
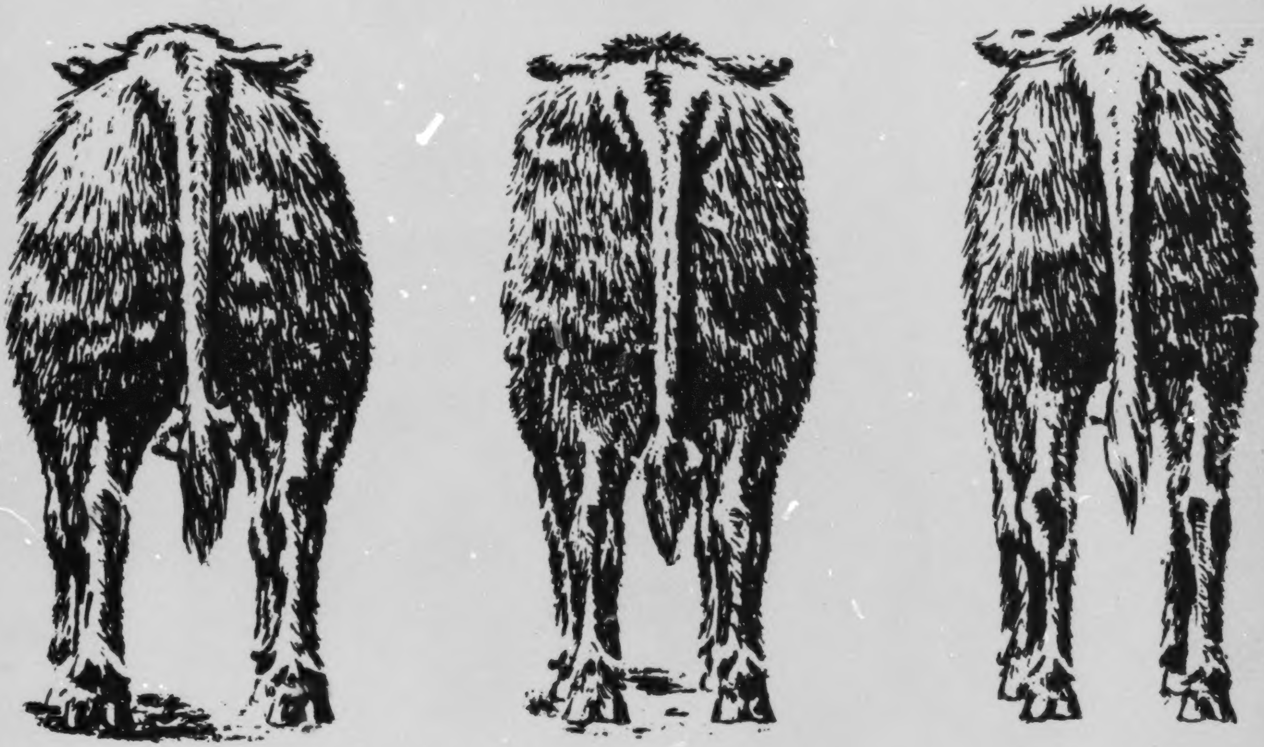


Transparency II-3-0

REAR VIEW OF THREE STEERS



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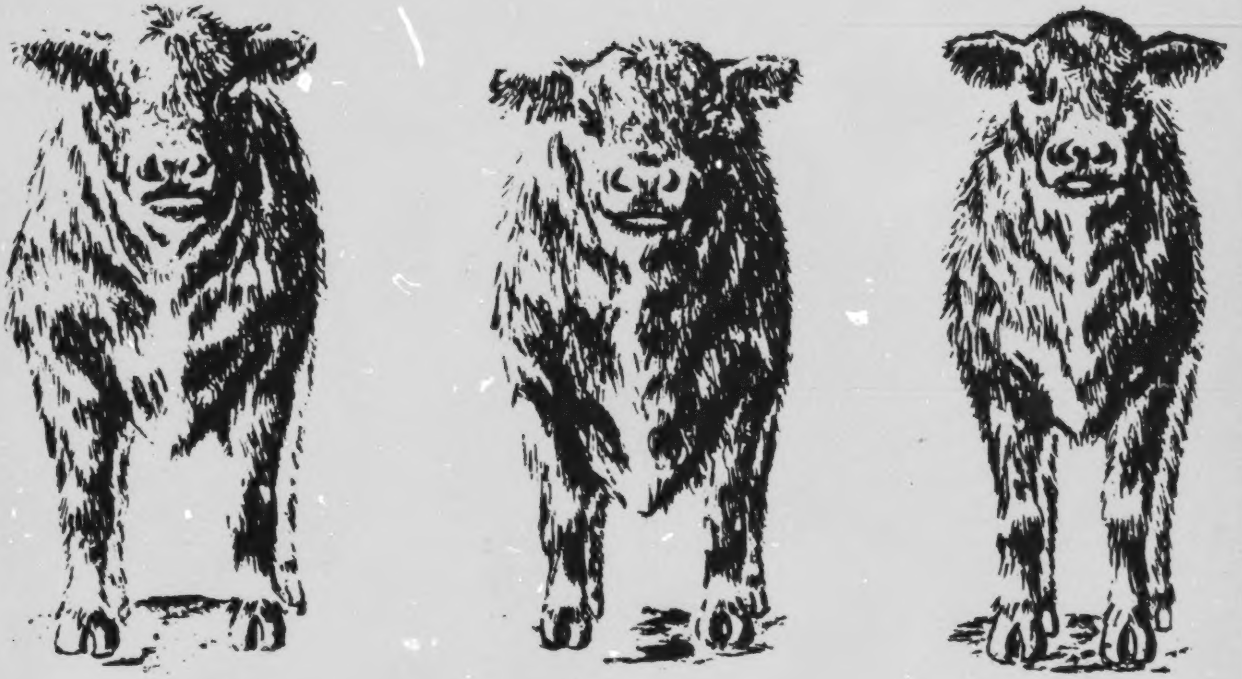
Transparency II-3-P

FRONT VIEW OF THREE STEERS



NO. 1 NO. 2 NO. 3

Transparency II-3-Q

FACTORS TO BE CONSIDERED BY PROSPECTIVE BREEDER CATTLE PRODUCERS

1. CAPITAL REQUIRED

2. EQUIPMENT AND LABOR REQUIRED

3. TIME REQUIRED

4. FUTURE DEMANDS

5. BREEDING PROFICIENCY

6. NUMBER OF MASTER BREEDERS

Transparency II-3-R

FACTORS FAVORABLE TO COMMERCIAL COW-CALF PRODUCTION

1. SMALLER INVESTMENT PER ANIMAL UNIT
2. LESS LABOR REQUIRED
3. LOWER LEVEL OF NUTRITION REQUIRED
4. ADAPTABLE TO LESS PRODUCTIVE LAND AREAS
5. LESS SHORT TERM RISK INVOLVED

FACTORS UNFAVORABLE TO COMMERCIAL COW-CALF PRODUCTION

1. SUBJECT TO GREATER PRICE FLUCTUATION
2. HERDBULLS USUALLY EXPENSIVE
3. BREEDING PROGRAM MAY REQUIRE MULTIPLE HERDS

FACTORS TO BE CONSIDERED BY PROSPECTIVE SLAUGHTER CATTLE PRODUCERS

. CAPITAL REQUIRED

2. FEEDER CATTLE SUPPLY

3. HANDLING FACILITIES

4. AVAILABLE FEED SUPPLY

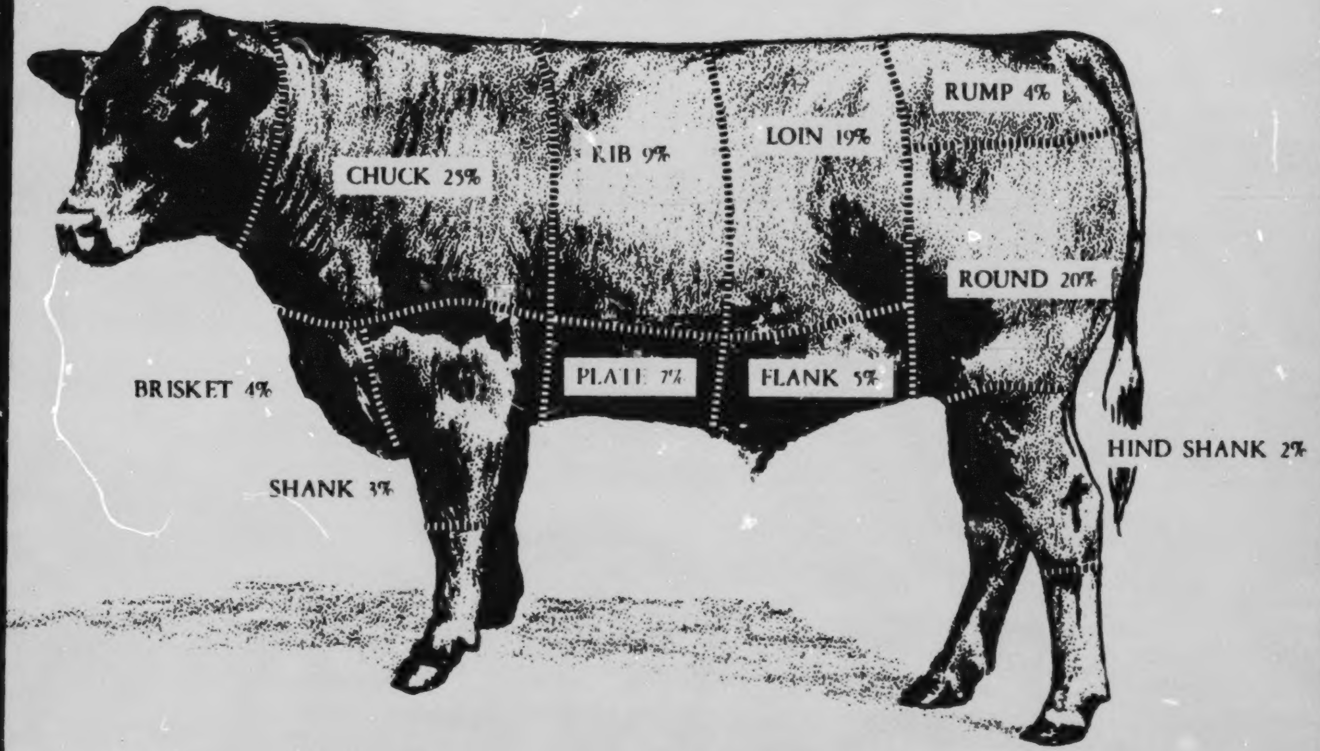
5. FEED EFFICIENCY

6. SLAUGHTER CATTLE DEMAND

7. PROFIT MARGIN

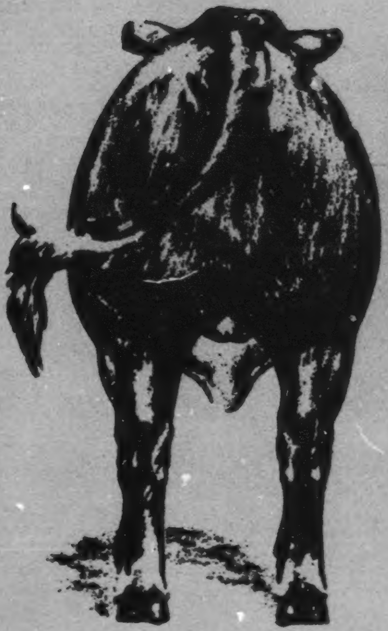
Transparency II-3-T

WHOLESALE CUTS OF BEEF

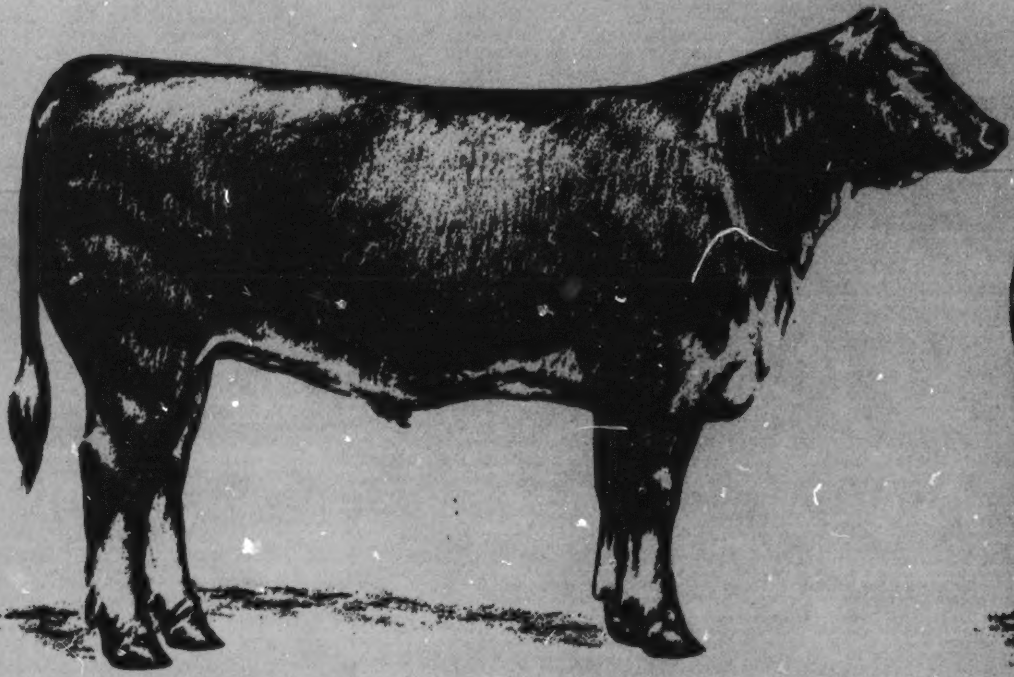

CHUCK 25%
RIB 9%
LOIN 19%
RUMP 4%
ROUND 20%
BRISKET 4%
PLATE 7%
FLANK 5%
HIND SHANK 2%
SHANK 3%

Transparency II-3-U

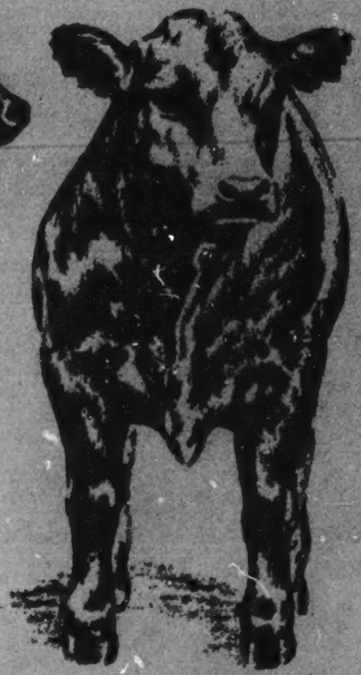
IDEAL BEEF CONFORMATION



REAR VIEW



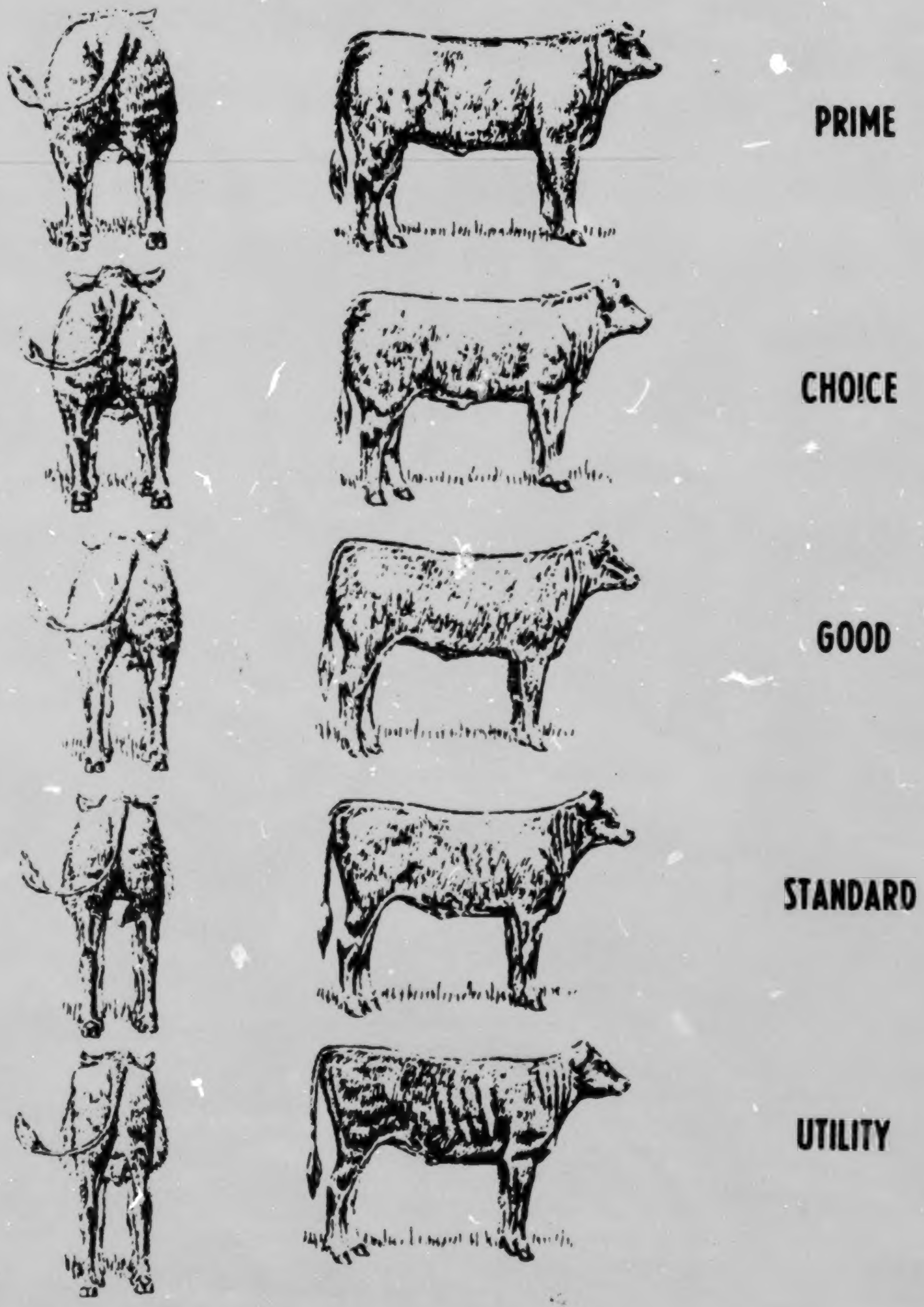
SIDE VIEW



FRONT VIEW

Transparency II-3-V

SLAUGHTER STEERS (U.S. 'QUALITY' GRADES)


PRIME
CHOICE
GOOD
STANDARD
UTILITY

Transparency II-3-W

Information Sheet II-3-C
LIVESTOCK JUDGING CONTEST

Purpose: Livestock judging involves beef cattle, swine, and sheep. The ability to judge livestock is one of the most essential and constantly used talents of the livestock person. The practical person must be a good feeder, a devoted caretaker, a skillful breeder and must know how to buy and sell to the best advantage. The ability to judge is the basis of success in all of these phases of livestock production. Even though considerable emphasis is placed on competitive judging and judging contests, this is not the most important purpose for learning to judge livestock. The development of livestock judging teams and judging contests aids in training young men and women to be able to select and improve breeds of livestock.

Rules and regulations:

1. Using form 2 (or computer card)

   A. At least four of the following classes of animals will be placed: breeding cattle, market cattle, breeding sheep, market sheep or lambs, market swine and breeding swine.
   B. Contestants will have 12 minutes to place each class.
   C. At lease one class from A. above will be designated as an oral reason class before the judging begins and participants will be notified.

2. Oral Reasons:

   A. Contestants will have 12 minutes to place the class and 5 extra minutes to prepare reasons.
   B. A maximum of 2 minutes will be allowed to give reasons.
   C. Contestants may use the placing card in delivering reasons; no other notes will be permitted.
   D. Reasons will be scored on the basis of 50 points for a perfect score.
   E. The State Staff and University personnel will determine the cut-off point as to which teams will be required to deliver oral reasons at all area contests.
   F. All sixteen teams will be required to deliver oral reasons at the State Contest.

3. Using Form 12:

   A. A maximum of one class of market swine consisting of no more than 10 head may be graded individually according to the latest US market grades.
   B. All grades will not necessarily be represented.
   C. For most current information, copies of standards and posters (large and small) illustrating these grades, write to Livestock-Poultry-Grain and Seed Division, Agricultural Marketing Service, USDA, Washington, D.C. 20250. Extension Folder 436, Pork Carcass and Slaughter Swine Grading, Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108.

4. Using Form 13:

   A. A maximum of one class of slaughter cattle may be graded individually according to the latest US market grades.
   B. The slaughter class may also be graded according to cutability.
   C. Refer to Bulletin No. 4 to order reference material.

5. Using Form 13A:

   A. A maximum of one class of no more than 10 feeder cattle may be graded according to the latest US market grades.
   B. More than one breed may be used in each class.
   C. Refer to Bulletin No. 4 to order reference material.

6. Using Form 13B:

   A. Female selection classes, one in beef and/or one in swine, made up of a maximum of eight animals may be used.
   B. Contestants will be required to select the four best animals from the eight, using visual appraisal and performance data.
   C. Performance data to be provided orally or in writing includes:
      both beef and swine--weight for age
      beef--adjusted 205 days weaning weights
      swine--days for 230 pounds, estimated B.F. (inches), loin eye area (square inch)
   D. Contestants will be allowed 15 minutes for each class.

Information Sheet II-3-D

STANDARD FFA PLACING CARD Form 2

Contest____________________

Class Name____________________

Class No.____________________

Contestant Name____________________

Contestant No.____________________

Tabulator's Score____________________

PLACINGS	CHECK PLACING
1-2-3-4	
1-2-4-3	
1-3-2-4	
1-3-4-2	
1-4-2-3	
1-4-3-2	
2-1-3-4	
2-1-4-3	
2-3-1-4	
2-3-4-1	
2-4-1-3	
2-4-3-1	
3-1-2-4	
3-1-4-2	
3-2-1-4	
3-2-4-1	
3-4-1-2	
3-4-2-1	
4-1-2-3	
4-1-3-2	
4-2-1-3	
4-2-3-1	
4-3-1-2	
4-3-2-1	

Information Sheet II-3-E

BEEF CATTLE GRADING CARD

***(Slaughter Cattle)**

Form 13

Class Name Slaughter Cattle ____________ Class Number ____________

Contestant Name ____________ Contestant Number ____________

	Quality Grade								Yield Grade							
Animal Number	PRIME		CHOICE		GOOD		STAND		(Cutability)					SCORE		
	High	Low	High	Low	High	Low	High	Low	1	2	3	4	5	Quality	Yield	Total
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
									TOTAL SCORE							

*Contestants will use this grading card for slaughter cattle.

Slaughter grades used in the contest are prime, choice, good and standard. No slaughter cattle over 42 months of age will be used; therefore, the "commercial" grade is not shown.

For slaughter cattle, the contestant is to place a check mark in the grade subdivision and also the correct cutability (yield grade) rating number for each animal. Six points are allowed for the correct grading of each animal.

A deduction of one point will be made for one-half grade above or below the official grade. Three points deducted for one full grade above or below the official grade and the score would be zero for more than one full grade above or below the official grade.

Credit of four points will be allowed for the correct cutability rating. Two points will be allowed if animal is graded one grade above or one grade below the correct yield grade.

Perfect score is 100 points.

Information Sheet II-3-F

BEEF CATTLE GRADING CARD
FEEDER CATTLE

Form 13 A

Class Name ______________________ Contestant Name ______________________

Class Number ______________________ Contestant Number ______________________

Animal Number	Frame Size				Muscle Thickness			SCORE		
	Large	Medium	Small	Inferior	1	2	3	Frame Size	Muscle Thickness	TOTAL
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
									TOTAL SCORE	

For Feeder Cattle Grading, the contestant is to place a check mark in the proper grade standard for Frame Size and a check mark in the grade standard for Muscle Thickness. No cattle over 36 months of age will be used.

Perfect score is 100 points.

SCORING:
- 5 points will be allowed for the correct frame size.
- 2 points will be allowed if the animal is graded—one grade above or one grade below the correct frame size.
- 5 points will be allowed if the correct muscle thickness is identified.
- 2 points will be allowed if the animal is graded—one grade above or one grade below the correct muscle thickness.

Information Sheet II-3-G

Form 13B

FFA LIVESTOCK CONTEST

FEMALE SELECTION CLASS______________________________

CONTEST NAME______________________________

CONTESTANT NUMBER______________________________

Circle the numbers of the four animals you want to keep

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8

Contestants will list the numbers of the four animals they select for replacements.

Contest officials will assign a point value to each one of the individual animals, giving the most points to the most desirable animal and the least points to the least desirable animal. If the contestant selects the best four animals full credit will be given.

SAMPLE FOR SCORING

Animal Numbers

8	7	6	5	4	3	2	1	Sample Class
(18)	(13)	(11)	(8)	(7)	(4)	(3)	(0)	Point Values

Animal Numbers Selected

					Score
Student A	6(11)	8(18)	4(7)	2(3)	39
Student B	8(18)	7(13)	6(11)	5(8)	50
Student C	7(13)	6(11)	5(8)	1(0)	32

Point values shown in Parentheses Point Values are established by official judges and will differ on each class.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 4: Selecting and Judging Dairy Cattle

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Select dairy cattle qualifying for economical milk production using correct judging techniques and selection bases.

2. Specific:

   a. Define new terms.
   b. Identify factors to consider in selecting individual animals.
   c. Identify and describe the unified score card for dairy cattle.
   d. Relate pedigree and production testing with dairy cattle selection.
   e. State reasons for placings of a class of dairy cattle.
   f.
   g.
   h.

B. Review Teaching Material

1. Hunsley, Roger E., W. Malcolm Beeson, and Julius E. Nordby. Livestock Judging, Selection and Evaluation. Danville: Interstate Publishers, 1978.

2. Report on Production Testing -- The Louisiana Dairy Herd Improvement Records Committee and The Louisiana Animal Breeding Cooperative, LSU Cooperative Extension Service, 1979.

3. Youtz, H. G. and A. C. Carlson. Judging Livestock, Dairy Cattle, Poultry, and Crops. 2nd. Edition, Englewood Cliffs, New Jersey: Prentice Hall, 1970.

4. Dairy Cattle Judging Contest, Bulletin 1542, Louisiana State Department of Education.

C. Special Arrangements

1. Materials
   a. Sample pedigrees
   b. Sample score cards and placing cards

2. Field trips (select farm or other facility with facilities and animals to provide practice judging classes).

3. Films on selecting and judging dairy animals.

II. Presentation of Lesson

A. Motivation

1. Offer evidence that correct type is correlated with production.

2. Compare the cost paid for other beverages with the cost of milk.

3. Prepare a display of consumables needed by the cow to produce one gallon of milk, e.g., water, minerals, hay, silage, feeds, etc. Calculate the cost of feedstuff and compare with the price of milk.

B. Content Outline

1. Terms

   a. Quality -- The degree of refinement of an animal (texture of hide and hair, clean cut head, harmony of parts, smoothness of finish).

   b. Constitution -- Those animal characteristics which determine in part the feeding ability, reproductive capacity, health, vigor, and longevity of the animal.

   c. Balance -- Equality in all parts.

   d. Fleshing -- The amount of lean or muscle tissue making up the animal in carcass.

   e. Bone or substance -- The skeletal framework and bone density of an animal.

   f. Sex character -- The peculiarity of appearance that distinguishes one sex from another, other than the presence of sex organs.

2. Type as a basis for selection (conformation and physical characteristics for high milk production)

   a. Type classification score card (Transparency II-A-D)

   b. Unified score card (the points or criteria to be considered and the emphasis to be given each point)
      1) General appearance (transparencies II-A-A&B)
      2) Dairy character (Transparency II-A-E)
      3) Body capacity (Transparency II-A-F)
      4) Mammary system (Transparency II-A-G)

3. Production records as a basis for selection

    a. Dairy Herd Improvement Association (DHIA) (Transparency II-4-H&L)

    b. Weigh-A-Day-A-Month

    c. Owner-Sampling Testing Records

    d. Conversion factors (used to standardize records) (Transparency II-4-I)

4. The pedigree as a basis for selection

    a. Information provided
        1) Ancestors of animal
        2) Production records and type classification

    b. Points to consider
        1) Consider sire and dam (constitute 50% of the animal's makeup)
        2) Character
        3) Heritability estimates (the percent of a trait inherited from an animal's parents which is not affected by environment.) (Transparency II-4-J, K, M & N)

C. Suggested Student Activities

1. Arrange for practice judging with portion of class determining the actual placings and other class members competing as contestants for judging scores (pictures and live animals).

2. Determine resource people in the area and write them for any available assistance to the class, e.g., local DHIA supervisors, local officers of breed associations.

3. Compile list of local activities promoting dairy industry, e.g., field days (date and place), livestock shows, short courses (extension grooming clinics).

4. Work problems using the conversion tables.

5. Work problems using the heritability estimates.

D. Suggested Study Questions

1. Define all terms associated with dairy cattle judging.

2. Explain factors to consider in selecting ideal dairy cattle.

3. What are the four major divisions of the dairy cattle scorecard? What factors are considered under each division?

4. How does pedigree and production testing relate to dairy cattle selection?

5. What is the proper technique for giving reasons on a placing class of dairy cattle?

SUGGESTED TERMS FOR GIVING ORAL REASONS IN DAIRY CLASSES

Terms Describing a Desirable Dairy Animal	Terms Describing an Undesirable Dairy Animal
GENERAL TYPE AND CONFORMATION:	
shows more breed-type truer breed type-better balanced animal in that it is neater-stronger, straighter lines-shows more quality thinner-more pliable-looser-finer, softer hair-more luster to hair	lacks breed type and characteristics- lacks type (balance) of other animals doesn't show the quality of hide and hair-coarser, brittle, weaker in top and bottom lines
HEAD:	
cleaner, trimmer about the face-more desireable dished face- broader between the eyes-larger, cleaner nostrils, broader-cleaner about the ears-brighter, clearer eyes-better set of horns	coarser, plainer about the head-face is too dished or straight-narrow between eyes-smaller nostrils, duller eyes
NECK:	
neater-smoother-more refinement-neater jointed to head and shoulder-more balance	coarser neck-lacks smoothness-loosely joined to neck and shoulders
FOREQUARTERS:	
neater shoulders-joined smoother to cow-sharper and more refined withers-neater, smoother shoulder-broader or deeper in the chest-better spring in the foreribs-more capacity in chest-larger heart girth-deeper in heart girth-smoother in crops-trimmer-neater in brisket-forelegs straighter-finer, more refined bone-stronger-straighter legs-stronger pastern	coarser-lacks smoothness-beefier over withers-coarser over the shoulders winged shoulders-narrow, pinched chest-coarser in the brisket-larger-coarse bone-lacks refinement of other animals-weaker in pastern-crooked legs

BODY CAPACITY:

straighter, stronger back-larger, springier ribs-longer, flatter, more refined ribs- longer, deeper, broader barrel, has more capacity-well balanced barrel-wider more uniform over loin-stronger back-carries out squarer and more level at the rump-carries lower and neater in the flanks

weaker back-lacks spring of rib-narrower, shallower barrel-lacks body capacity not as well balanced-narrower, shorter over the loin-drops off over rump-cut up in flank

HINDQUARTERS:

wider and squarer at the hooks longer and wider rump-level and squarer over the rump-wider over the pins-leveler, wider hooks-smoother and more refined in the thighs-more refined in the legs-stronger, straighter legs

narrower at the hooks-shorter, narrower, drooping rump-narrower over pins-coarser thighs-crooked legs-cow hocked-weaker in the legs

UDDER:

larger, more refined udder-stronger udder-leveler front and rear udder attachment-udder carries in smoother to the stomach wall-more balanced udder-softer and more pliable udder-squarely placed teats-teats more uniform in size-more prominent milk veins and wells-more complex branching of veins.

pendulous, broken down udder-broken down more in rear and front udder attachment-poorer udder attachment-udder lacks balance-halved or quartered-teats less desirable in size-texture and shape not as desirable-lacks milk veins and well development veins are less branching of veins.

HINTS in GIVING ORAL REASONS

1. Refer to "Giving Oral Reasons" in the Livestock section.
2. Don't use "better" unless more detailed explanation follows. ("Better spring of ribs" - in what way is it better?)
3. Always compare animals; never describe.
4. Be sure of reasons; be sure reasons are organized; don't jump from one animal to another or from one part to another.
5. Include opening statement and closing statement.

INFORMATION SHEET II-4-A

Holstein cows

I place this class of Holstein cows 3-4-1-2. I chose three as my top cow and placed her over four, considering this a rather easy placing, because three excells four in dairy character and general appearance. She has a longer and leaner neck, is sharper in the withers, and is leaner in the thighs. She is also much stronger in her back and loin, more level from hips to pins, neater in her tail setting, and stands on a much straighter pair of rear legs. She is deeper in the chest and has more balance to the udder with a more even teat placement.

However, I would grant that four is deeper in the rear rib with a little higher and wider rear udder attachment. I would like to see my top cow, three, with a little more stretch and length of barrel.

In my middle pair, four goes over one, another rather easy placing. Four excells one in body capacity and mammary system being much deeper in her rear rib and having more spread of rib. Her udder extends much higher and stronger in rear udder attachment with more rear udder development and a neater teat placement. I grant that one stands on a straighter pair of rear legs that are stronger in the pasterns.

In my bottom pair, I placed one over two. I considered this a very close placing, but one excells two in general appearance having a little more style and balance, more breed character in the head and neck, and a straighter pair of rear legs. One also excells two in dairy character being sharper in the withers, a little more lean in the neck, and a little wider in the ribs.

I grant that two excells one in body capacity having a greater spring and spread of rib and being deeper in both the chest and rear ribs, but I placed her last because she lacks the overall balance of one. She is a little too short and thick in her neck, and like one, her udder is unbalanced with weak fore and rear udder attachments.

CLASSIFIER'S REPORT
OF HERD CLASSIFICATION

SIRE NUMBER	ANIMAL NUMBER	NAME OF ANIMAL	DATE OF BIRTH			FINAL SCORE *	GENERAL APPEARANCE	DAIRY CHARACTER	BODY	MAMMARY	DESCRIPTION OF ANIMAL												
			MO.	DAY	YR.						GENERAL							MAMMARY					
											STATURE	HEAD	FRONT END	BACK	RUMP	HIND LEGS	FEET	FORE UDDER	REAR UDDER	UDDER SUPPORT AND FLOOR	QUALITY	TEATS	MISCELLANEOUS
1000000	4567891	PRAIRIE VIEW SALLY	06	08	56	90	E	E	E	E	1	3	2	1	1	2	1	2	1	2	2	1	

TERMS—GENERAL

STATURE

1. UPSTANDING
2. INTERMEDIATE
3. LOW SET

HEAD

1. CLEAN-CUT, WELL-PROPORTIONED WITH STYLE AND STRENGTH
2. STRONG-LACKING STYLE
3. SHORT
4. PLAIN AND/OR COARSE
5. WEAK

FRONT END

1. SHOULDER SMOOTHLY BLENDED, CHEST STRONG AND WIDE
2. MEDIUM STRENGTH AND WIDTH
3. COARSE SHOULDER AND NECK
4. NARROW AND WEAK

BACK

1. STRAIGHT, FULL CROPS, STRONG
2. LACK OF DEFINED HALVING
3. FLOOR TOO LOW
4. TILTED
5. BROKEN SUSPENSORY LIGAMENT AND/OR WEAK FLOOR

* E (EXCELLENT)	90-100	G (GOOD)	75-79
V (VERY GOOD)	85-89	F (FAIR)	65-74
+ (GOOD PLUS)	80-84	P (POOR)	64&BELOW

UDDER QUALITY

1. SOFT AND PLIABLE
2. INTERMEDIATE
3. COULD NOT DETERMINE
4. MEATY

TEAT SIZE AND PLACEMENT

1. PLUMB, DESIRABLE LENGTH AND SIZE AND SQUARELY PLACED
2. TOO CLOSE ON SIDE
3. REAR TEATS BACK TOO FAR
4. WIDE FRONT TEATS
5. UNDESIRABLE SHAPE

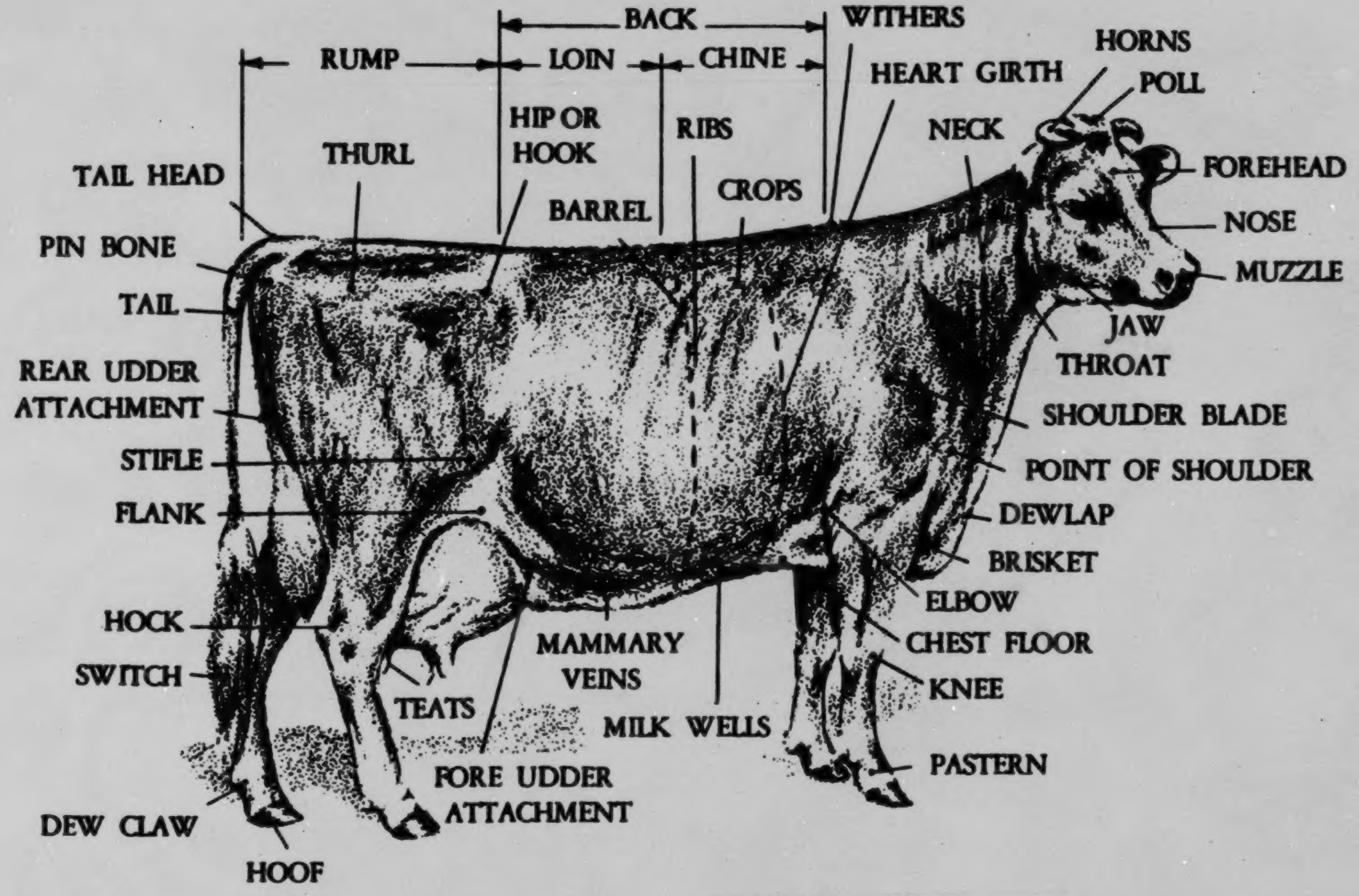
TERMS — MISCELLANEOUS

1. WINGED SHOULDER
2. FRONT LEGS TOE OUT
3. WEAK PASTERNS
4. CRAMPY
5. SMALL FOR AGE

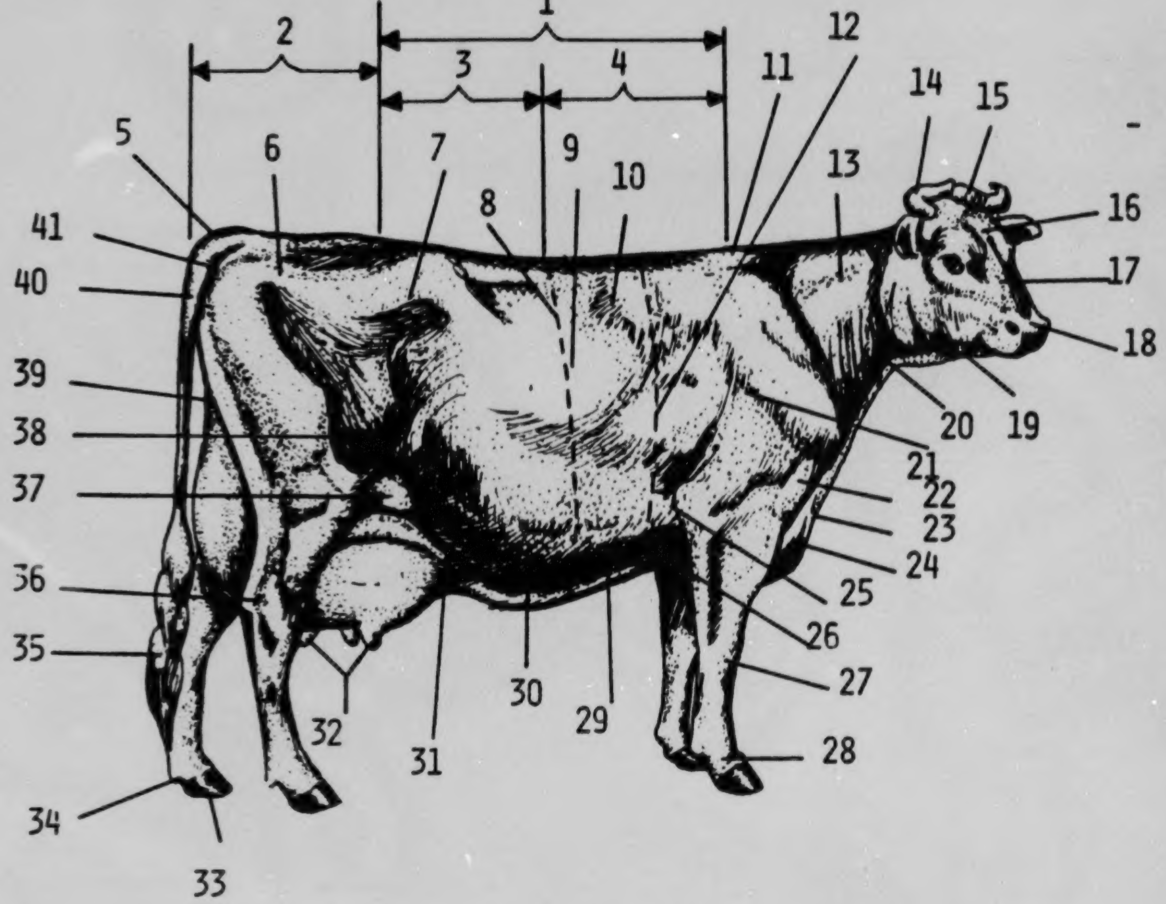
CLASSIFIER'S SIGNATURE ______________________ DATE ____________

Transparency II-4-A

PARTS OF A DAIRY COW


BACK
RUMP
LOIN
CHINE
WITHERS
HORNS
POLL
HEART GIRTH
HIP OR HOOK
THURL
RIBS
NECK
FOREHEAD
TAIL HEAD
CROPS
BARREL
NOSE
PIN BONE
MUZZLE
TAIL
JAW
THROAT
REAR UDDER ATTACHMENT
SHOULDER BLADE
STIFLE
POINT OF SHOULDER
FLANK
DEWLAP
BRISKET
ELBOW
HOCK
MAMMARY VEINS
CHEST FLOOR
SWITCH
KNEE
TEATS
MILK WELLS
PASTERN
FORE UDDER ATTACHMENT
DEW CLAW
HOOF

Transparency II-4-B



PARTS OF A DAIRY COW

1
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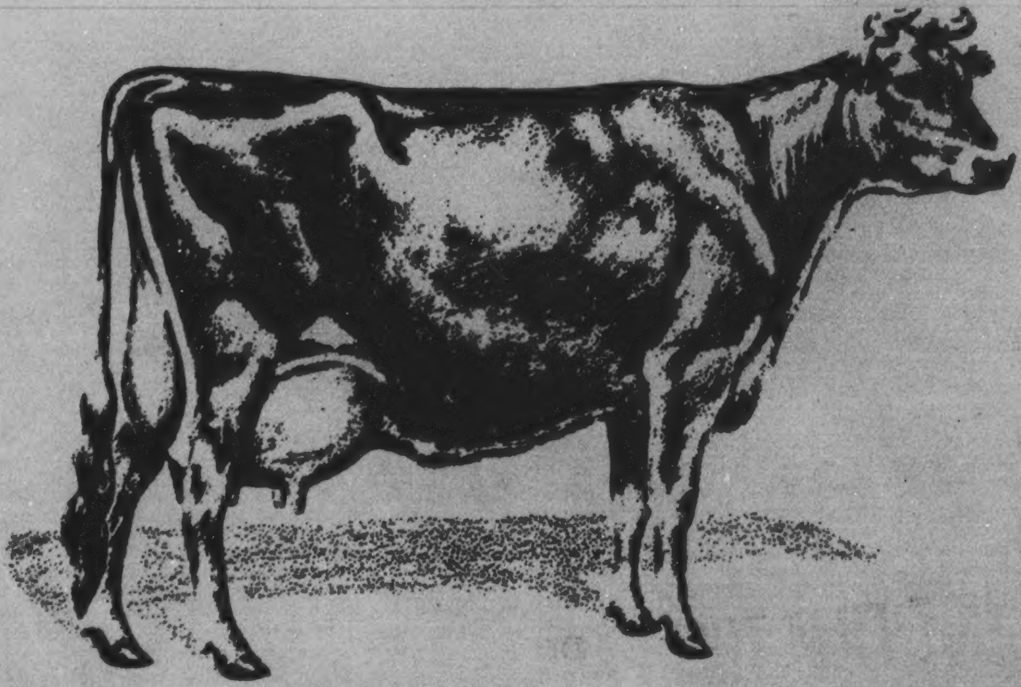
41

DAIRY COW UNIFIED SCORE CARD

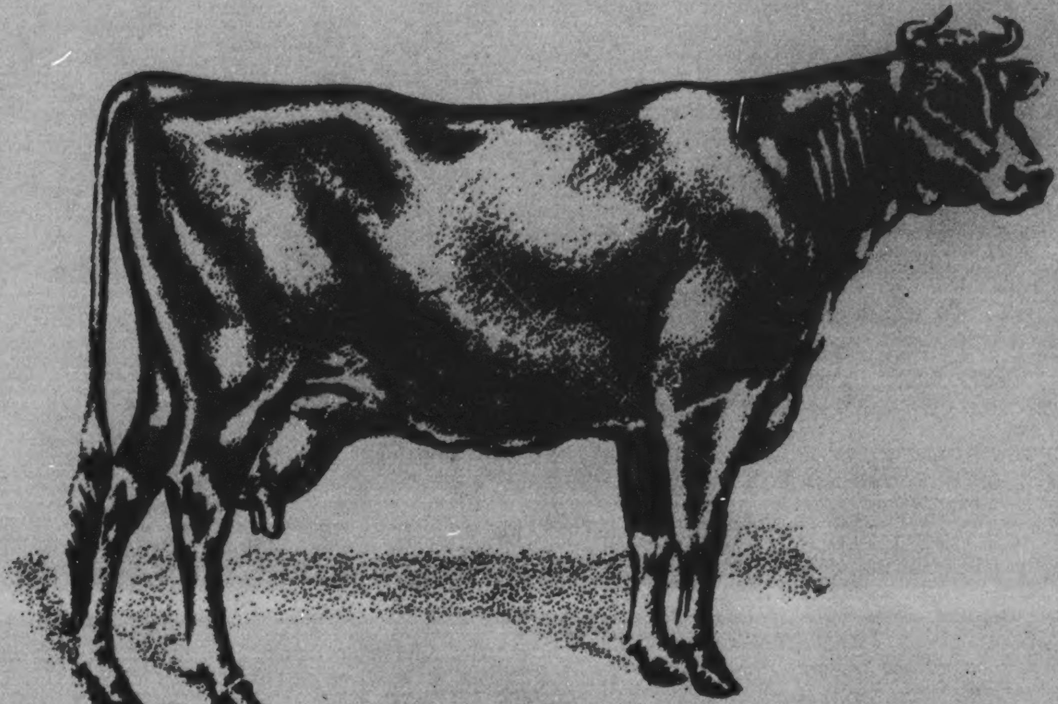
BREED CHARACTERISTICS SHOULD BE CONSIDERED IN THE APPLICATION OF THIS SCORE CARD		Perfect Score
Order of Observation		
1. GENERAL APPEARANCE		**30**
(ATTRACTIVE INDIVIDUALITY WITH FEMININITY, VIGOR, STRETCH, SCALE, HARMONIOUS BLENDING OF ALL PARTS AND IMPRESSIVE STYLE AND CARRIAGE. ALL PARTS OF A COW SHOULD BE CONSIDERED IN EVALUATING A COW'S GENERAL APPEARANCE)		
BREED CHARACTERISTICS	10	
COLOR		
SIZE		
HEAD		
SHOULDER BLADES	10	
BACK		
RUMP		
LEGS AND FEET	10	
2. DAIRY CHARACTER		**20**
(EVIDENCE OF MILKING ABILITY, ANGULARITY, AND GENERAL OPENNESS, WITHOUT WEAKNESS, FREEDOM FROM COARSENESS, GIVING DUE REGARD TO PERIOD OF LACTATION)		
NECK, WITHERS, RIBS, FLANKS, THIGHS, AND SKIN.	20	
3. BODY CAPACITY		**20**
(RELATIVELY LARGE IN PROPORTION TO SIZE OF ANIMAL, PROVIDING AMPLE CAPACITY, STRENGTH, AND VIGOR)		
BARREL	10	
HEART GIRTH	10	
4. MAMMARY SYSTEM		**30**
(A STRONGLY ATTACHED, WELL BALANCED, CAPACIOUS UDDER OF FINE TEXTURE INDICATING HEAVY PRODUCTION AND A LONG PERIOD OF USEFULNESS)		
UDDER	10	
FORE UDDER	6	
REAR UDDER	7	
TEATS	5	
MAMMARY VEINS	2	
TOTAL		**100**

Transparency II-4-D 324

DAIRY CHARACTER



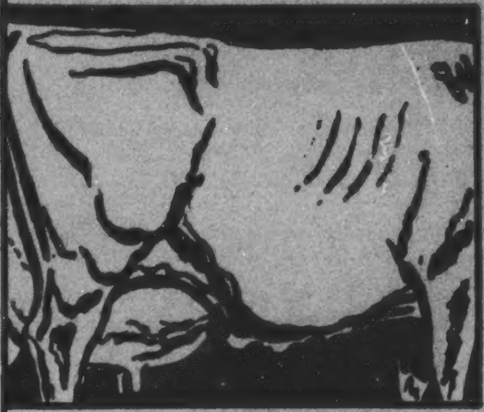
GOOD

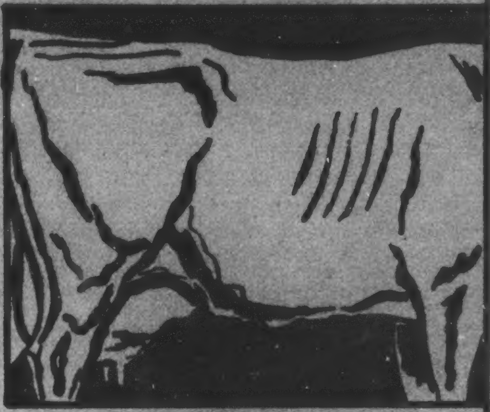


POOR

Transparency II-4-E

BODY CAPACITY


GOOD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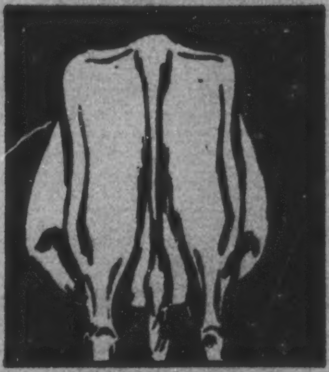
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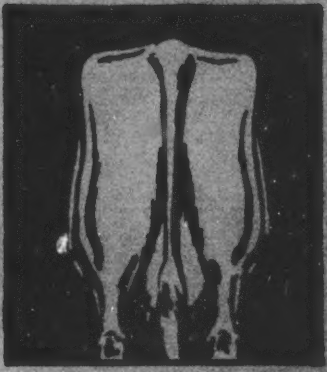
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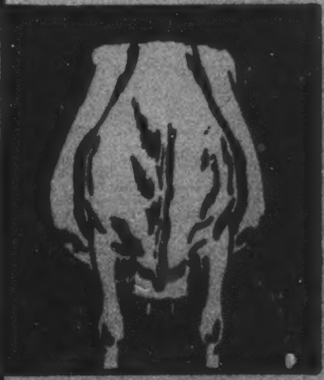
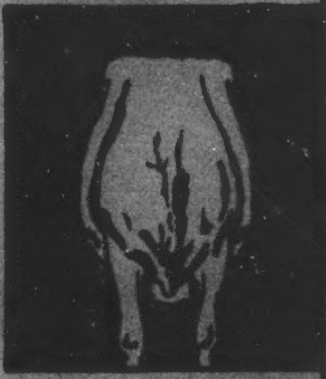
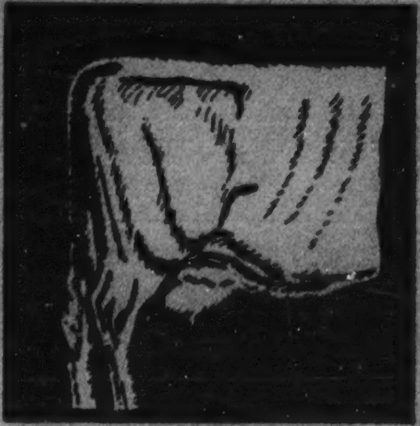

GOOD

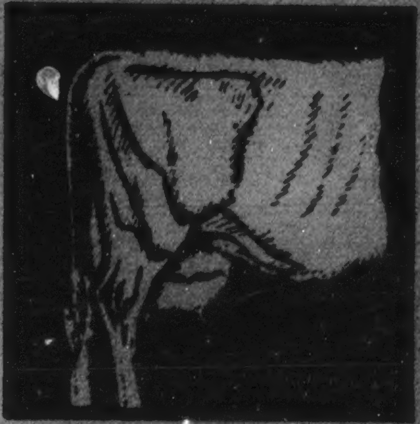

POOR

Transparency II-4-F

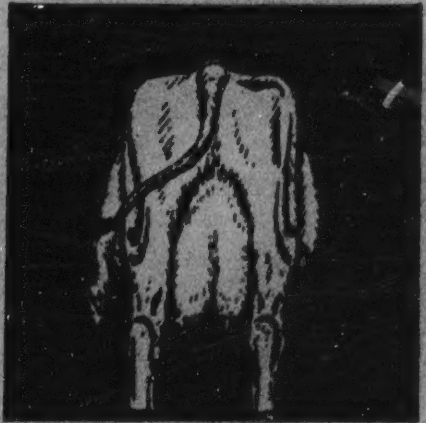
MAMMARY DEVELOPMENT



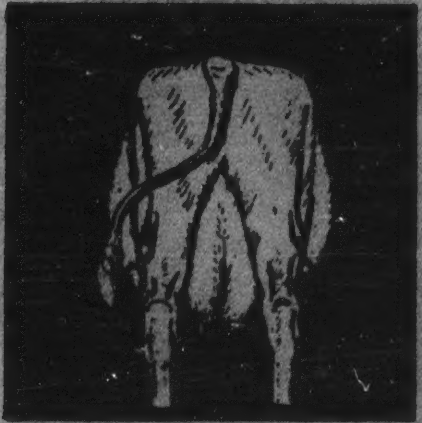
GOOD UDDER AND FORE UDDER ATTACHMENT



POOR UDDER AND FORE UDDER ATTACHMENT



GOOD UDDER AND REAR UDDER ATTACHMENT



POOR UDDER AND REAR UDDER ATTACHMENT

Transparency II-4-G

DAIRY HERD IMPROVEMENT RECORDS

BARN SHEET--DHI-201

BREED	REGISTRATION OR EAR-TAG NO.	COW INDEX NO.	LAST TEST DAY DATA				CURRENT TEST DAY DATA							REPRODUCTIVE STATUS		SIRE OR CALF ID
			DAILY MILK WEIGHTS LBS.	%B-FAT	DATE		MILKING WTS		%B-FAT	SAMPLE NO.	DATE		CONC. FED LBS.	LAST DATE BRED	DATE DUE	
					MO.	DAY	1ST	2ND			MO.	DAY				
3	64WAF4203	0002	33.0	3.3	9	25	17.5	18.0	3.5	6	10	25	16	8-18-73	5-28-74	H78

LACTATION RECORDS TO DATE ENTERED HERD

INDEX NUMBER	LAST MONTH		DATE OF FRESHENING			NUMBER DAYS		MILK POUNDS	FAT POUNDS	VALUE PRODUCT	INCOME OVER FEED COST
	DAILY MILK WEIGHTS	%B-FAT	MO.	DAY	YEAR	DRY	IN MILK				
0061	44.3	4.0	12	15	72		215	9,521	503	495.00	250.00

MONTHLY HERD DATA

GROUP	SILAGE		DRY FORAGE		GROUP FED CONC.		PASTURE		CONCENTRATES
DRY	LBS. CONS.	COST ENE TON	LBS. CONS.	COST ENE TON	LBS. CONS.	COST ENE TON	QUALITY	COST/M	COST ENE TON
3									
MILK									
2									
MILK			8.0	$36.00					$ 123.00

DATE OF TEST			BULK TANK WEIGHTS(LBS.)		MILK PRICING INFORMATION					BEGINNING TIME OF MILKING				REPORT FOR MONTH OF
MO.	DAY	YEAR	NO. MILKINGS	TOTAL LBS. OF MILK	NET/CWT.		%B-FAT	B-FAT DIFF.		A. M.		P. M.		
					$	CENTS		CENTS	10TH	HOUR	MIN.	HOUR	MIN.	
9	25	73			9	82	3.8	0	09	6	15	5	15	SEPT.

SUPERVISOR NAME
WALKER

Transparency II-4-H

CONVERSION FACTORS

(USED TO STANDARDIZE RECORDS)

AGE

(BASED ON AGE WHEN PRODUCTION RECORD WAS BEGUN)

AGE YR., MO.	AYRSHIRE	BROWN SWISS	GUERNSEY	HOLSTEIN	JERSEY	MILKING SHORTHORN
2—0	1.30	1.45	1.24	1.31	1.27	1.42
3—0	1.18	1.23	1.12	1.18	1.15	1.24
4—0	1.10	1.10	1.06	1.08	1.06	1.13
5—0	1.03	1.04	1.02	1.02	1.02	1.07
6—0	1.00	1.00	1.00	1.00	1.00	1.01
7—0	1.00	1.00	1.00	1.00	1.00	1.00

3X MILKING RECORDS

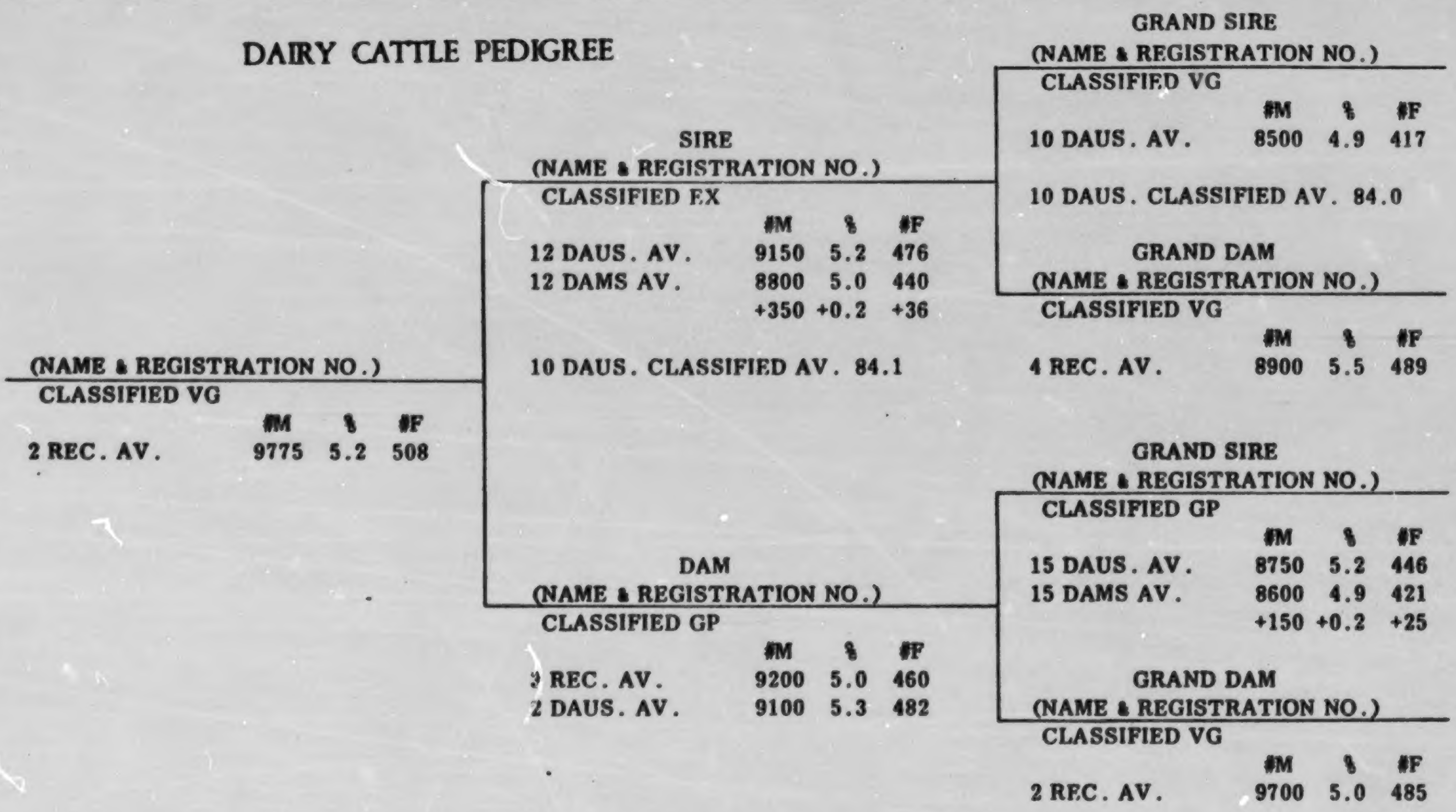
AGE AT CALVING	FACTORS FOR 3X RECORDS
2 TO 3 YEARS	.83
3 TO 4 YEARS	.85
4 YEARS AND OVER	.87

LENGTH OF LACTATION

240 DAYS OR LESS	1.15	335 DAYS	.93
315 DAYS	.98	355 DAYS	.89

Transparency II-4-I

DAIRY CATTLE PEDIGREE



(NAME & REGISTRATION NO.)
CLASSIFIED VG

	#M	%	#F
2 REC. AV.	9775	5.2	508

SIRE
(NAME & REGISTRATION NO.)
CLASSIFIED EX

	#M	%	#F
12 DAUS. AV.	9150	5.2	476
12 DAMS AV.	8800	5.0	440
	+350	+0.2	+36

10 DAUS. CLASSIFIED AV. 84.1

DAM
(NAME & REGISTRATION NO.)
CLASSIFIED GP

	#M	%	#F
3 REC. AV.	9200	5.0	460
2 DAUS. AV.	9100	5.3	482

GRAND SIRE
(NAME & REGISTRATION NO.)
CLASSIFIED VG

	#M	%	#F
10 DAUS. AV.	8500	4.9	417

10 DAUS. CLASSIFIED AV. 84.0

GRAND DAM
(NAME & REGISTRATION NO.)
CLASSIFIED VG

	#M	%	#F
4 REC. AV.	8900	5.5	489

GRAND SIRE
(NAME & REGISTRATION NO.)
CLASSIFIED GP

	#M	%	#F
15 DAUS. AV.	8750	5.2	446
15 DAMS AV.	8600	4.9	421
	+150	+0.2	+25

GRAND DAM
(NAME & REGISTRATION NO.)
CLASSIFIED VG

	#M	%	#F
2 REC. AV.	9700	5.0	485

NOTE: ALL RECORDS ADJUSTED TO 2X-305 DAYS MATURE EQUIVALENT BASIS.

DAIRY CATTLE PEDIGREE TERMS AND ABBREVIATIONS

1. 2X-305 Days - Milked twice a day for 305 days; the records on most pedigrees are adjusted to 2X-305 days mature equivalent basis.
2. #M - Pounds of milk
3. % - Percent of butterfat
4. REC. - Record(s)
5. #F - Pounds of butterfat
6. AV. - Average
7. DAUS. - Daughters

Transparency II-4-J

HERITABILITY ESTIMATES OF DAIRY CATTLE

TRAIT	AVERAGE PERCENT
FAT TEST	50
PROTEIN TEST	50
SIZE	50
BIRTH WT.	45
WEIGHT	35
GESTATION LENGTH	35
FORE AND REAR UDDER	35
GENERAL APPEARANCE	33
TYPE	30
DAIRY CHARACTER	30
MILK YIELDS	25
MASTITIS	25
BREED CHARACTER	25
MILKING QUALITY	24
BODY CAPACITY	23
UDDER DEPTH	22
TEATS, VEINS AND QUALITY	20
FEET, LEGS	18
LONGEVITY	10
UDDER SIZE AND SHAPE	7
TEAT LENGTH	5
REPRODUCTIVE PERFORMANCE	3
SERVICE / CONCEPTION	3

Transparency II-4-K

CHARACTERISTICS OF THE MAJOR DAIRY BREEDS

BREED	MATURE COW SIZE (lbs.)	*MILK PRODUCTION (lbs.)	*PERCENT BUTTERFAT	*BUTTERFAT PRODUCTION (lbs.)	SIZE OF CALVES AT BIRTH (lbs.)	CATTLE REGISTRATION 1972-73
AYRSHIRE	1100 TO 1300	12,296	3.94	484	70 TO 80	13,883
BROWN SWISS	1200 TO 1400	12,548	4.07	511	90 TO 100	15,294
GUERNSEY	800 TO 1100	11,035	4.67	515	65 TO 75	34,451
HOLSTEIN-FRIESIAN	1100 TO 1400	15,318	3.65	559	85 TO 95	277,851
JERSEY	600 TO 900	10,458	4.89	511	50 TO 60	39,396

*These figures were taken from the July 1981 DHI Letter (USDA), representing the averages for the various breeds.

Transparency II-4-L

Information Sheet II-4-B

DAIRY CATTLE JUDGING CONTEST

Purpose: Dairy Cattle Judging, the ability to recognize the most desirable characteristics of dairy cattle and make wise selections when establishing a herd or making replacements, is essential for successful dairy farming. It requires a knowledge of dairy cattle type and also a knowledge of sound methods of interpreting records of milk and better fat production. Not only is it necessary to have a knowledge of sound methods of evaluating type and production capacity, it is also necessary to select animals that have the ability to transmit desirable type and high production capacity to their offspring.

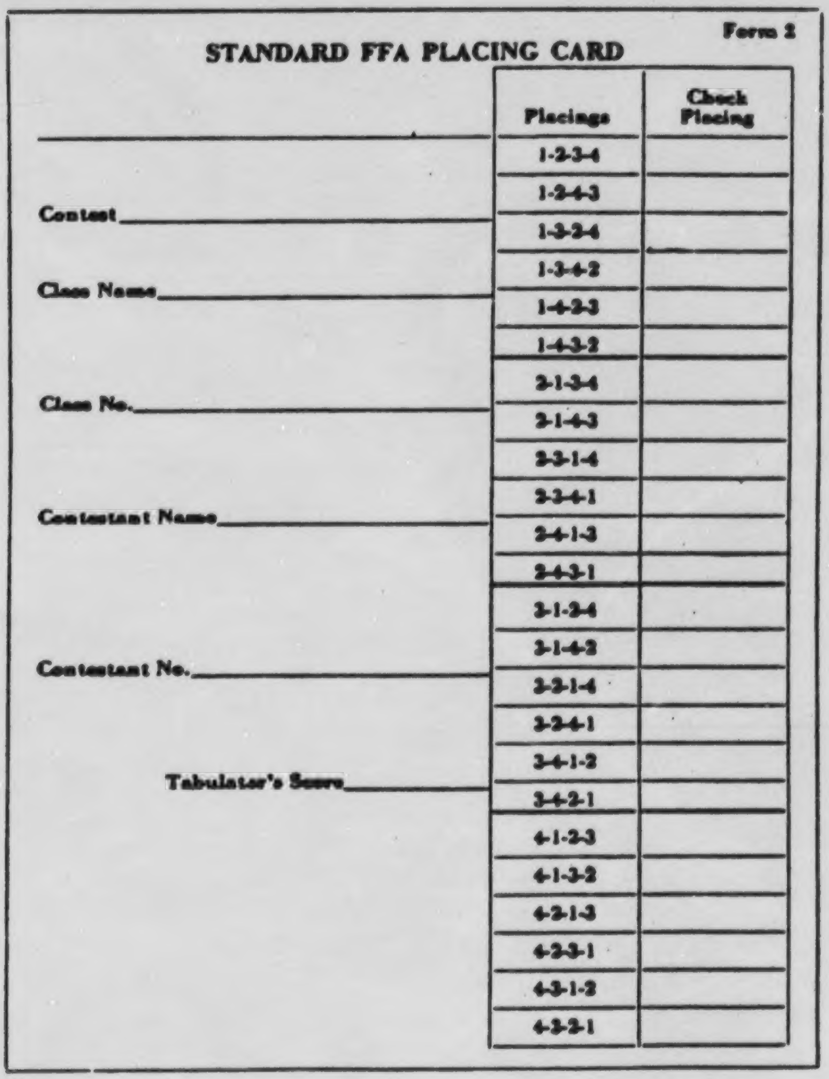
Rules and Regulations:

1. A. Five breeds of dairy cattle may be used in this contest, namely: Ayrshire, Brown Swiss, Guernsey, Holstein and Jersey.
    B. One pedigree evaluation class (no animals present) will be given.
2. Using Form 2:
    A. Nine classes of four animals from the above breeds may be placed on type.
    B. One class of pedigree evaluation will be given. (Perfect score - 50 points on pedigree.)
    C. These classes may be either cows or heifers.
    D. Contestants will be allowed 12 minutes to place each class.
    E. Perfect score is 50 points.
3. Reasons Classes:
    A. Contestants will have 12 minutes to place the class and 5 extra minutes to prepare reasons.
    B. No more than 2 minutes will be allowed in delivering reasons.
    C. Contestants may use the placing card in delivering reasons.
    D. No other notes will be permitted.
    E. Reasons will be scored on the basis of 50 points for a perfect score.
    F. Three classes of oral reasons may be designated for preparation. (50 points per class)
    G. The reasons class or classes will be designated before the judging begins.
4. Pedigree evaluation should be based on the following criteria:
    A. Pedigree evaluation will constitute the equivalent of one placing class.
    B. Ranking of pedigrees will be scored on the basis of 50 points for a perfect placing.
    C. Pedigrees are of value to the degree they indicate the animal's ability to transmit production and type traits to its offspring.
    D. Completeness (number of daughters on records), accuracy (predictability), level of performance (type and production) and profitability are factors to consider in evaluating pedigrees.
    E. Animals will be placed 1, 2, 3, 4, using Form 2.

5. Viewing of Animals:
   - A. Contestants will be permitted to view the animals from all angles, if possible, but will not be permitted to handle them.
   - B. If possible, division superintendents will arrange for front view, rear view, and side view, and close-up inspection of all classes.
   - C. Animals will be numbered 1, 2, 3, 4, left to right, as viewed from the rear.
6. Special note:
   - A. At all Area Contests, the State Staff and University personnel will determine the cut-off point as to which top team will be required to give oral reasons.
   - B. At the State Contest, all sixteen teams will be required to give oral reasons.
   - C. The Dairy Breed Associations provide helpful information and pictures. Train your team to use the score cards properly.

Information Sheet II-4-C

The following form will be used in placing designated classes of dairy cattle, livestock, meats and poultry.



Form 2

STANDARD FFA PLACING CARD

Contest ____________________

Class Name ____________________

Class No. ____________________

Contestant Name ____________________

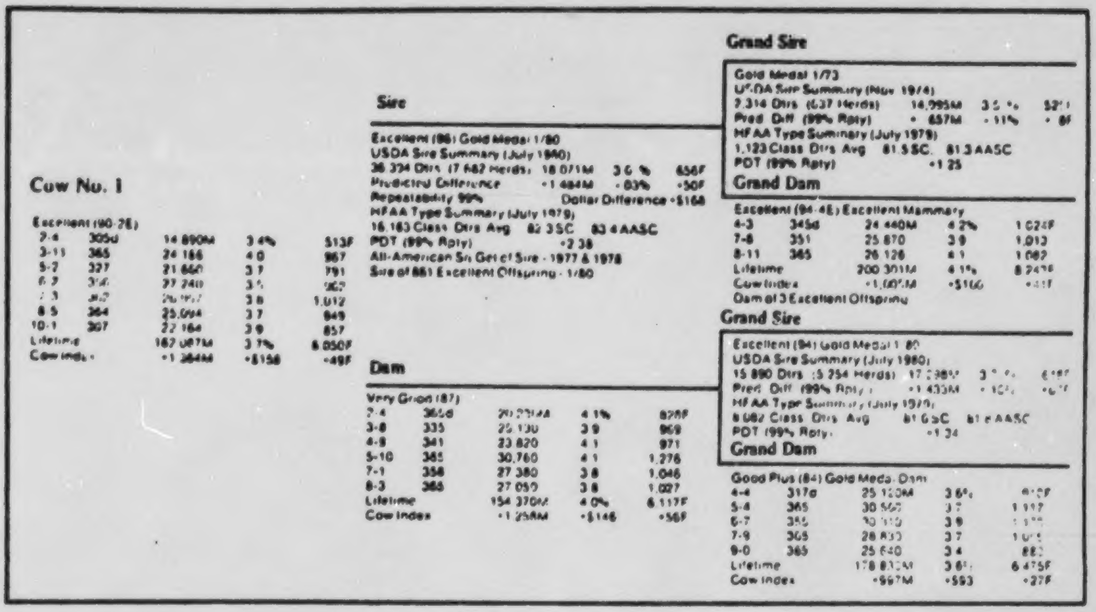
Contestant No. ____________________

Tabulator's Score ____________________

Placings	Check Placing
1-2-3-4	
1-2-4-3	
1-3-2-4	
1-3-4-2	
1-4-2-3	
1-4-3-2	
2-1-3-4	
2-1-4-3	
2-3-1-4	
2-3-4-1	
2-4-1-3	
2-4-3-1	
3-1-2-4	
3-1-4-2	
3-2-1-4	
3-2-4-1	
3-4-1-2	
3-4-2-1	
4-1-2-3	
4-1-3-2	
4-2-1-3	
4-2-3-1	
4-3-1-2	
4-3-2-1	

EXAMPLES OF DAIRY CATTLE PEDIGREES

Information Sheet II-4-D



Cow No. 1

Excellent (90-2E)

2-4	305d	14 890M	3.4%	513F
3-11	365	24 166	4.0	967
5-2	327	21 660	3.7	791
6-2	[illegible]	27 240	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	3.8	1,012
8-5	364	25,094	3.7	949
10-1	307	22 164	3.9	857
Lifetime		162 087M	3.7%	6 050F
Cow Index		+1 384M	+$156	+49F

Sire

Excellent (96) Gold Medal 1/80
USDA Sire Summary (July 1980)
36 334 Dtrs (7 682 Herds) 18 071M 3.6 % 656F
Predicted Difference +1 484M -.03% +50F
Repeatability 99% Dollar Difference +$168
HFAA Type Summary (July 1979)
16,163 Class Dtrs Avg 82 3 SC 83 4 AASC
PDT (99% Rpty) +2 38
All-American Sr Get of Sire - 1977 & 1978
Sire of 861 Excellent Offspring - 1/80

Dam

Very Good (87)

2-4	365d	[illegible]	4.1%	828F
3-8	335	25 130	3.9	969
4-9	341	23 820	4.1	971
5-10	365	30,760	4.1	1,276
7-1	358	27 380	3.8	1,046
8-3	365	27 050	3.8	1,027
Lifetime		154 370M	4.0%	6 117F
Cow Index		+1 258M	+$146	+56F

Grand Sire

Gold Medal 1/73
USDA Sire Summary (Nov 1974)
2,314 Dtrs (637 Herds) 14,995M 3.5 % [illegible]
Pred Diff (99% Rpty) + 657M -.11% + 8F
HFAA Type Summary (July 1979)
1,123 Class Dtrs Avg 81.5 SC 81.3 AASC
PDT (99% Rpty) +1 25

Grand Dam

Excellent (94-4E) Excellent Mammary

4-3	345d	24 440M	4.2%	1 024F
7-8	351	25 870	3.9	1,013
8-11	365	26 126	4.1	1 082
Lifetime		200 301M	4.1%	8 247F
Cow Index		+1,00?M	+$166	[illegible]

Dam of 3 Excellent Offspring

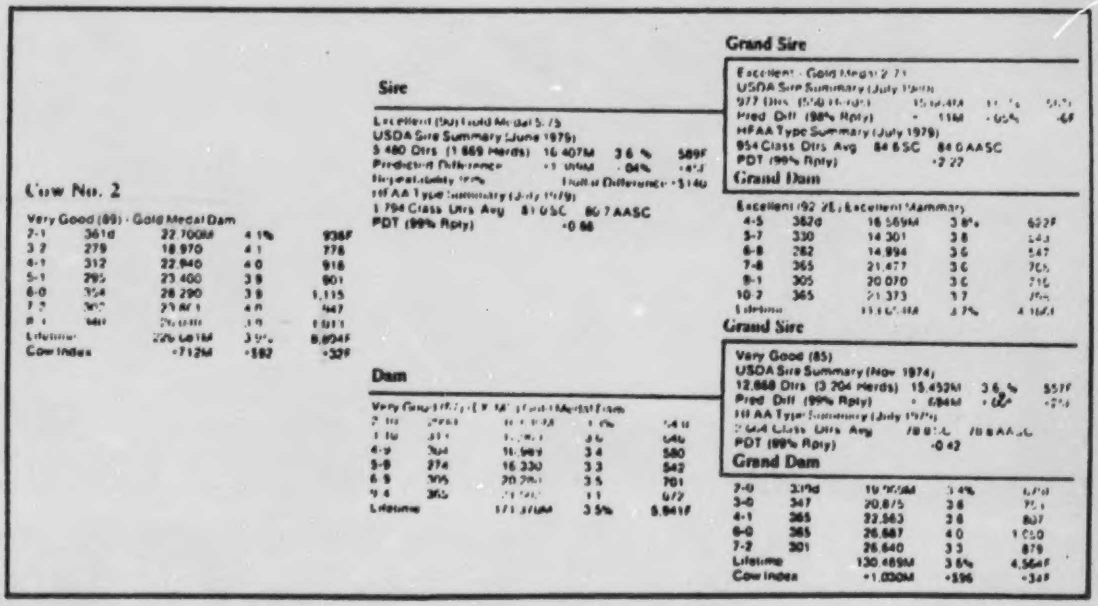
Grand Sire

Excellent (94) Gold Medal 1 80
USDA Sire Summary (July 1980)
15 890 Dtrs (5 254 Herds) [illegible] [illegible] [illegible]
Pred Diff (99% Rpty) +1 433M [illegible] [illegible]
HFAA Type Summary (July 1979)
8 062 Class Dtrs Avg 81 6 SC 81 ? AASC
PDT (99% Rpty) +1 34

Grand Dam

Good Plus (84) Gold Medal Dam

4-4	317d	25 120M	3.6%	[illegible]
5-4	365	30 [illegible]	3.7	1 11?
6-7	355	[illegible]	3.9	[illegible]
7-9	365	28 [illegible]	3.7	[illegible]
9-0	365	25 640	3.4	88?
Lifetime		178 [illegible]M	3.6%	6 475F
Cow Index		+967M	+$93	+27F



Cow No. 2

Very Good (89) - Gold Medal Dam

2-1	361d	22 700M	4.1%	938F
3 2	279	18 970	4.1	776
4-1	312	22,940	4.0	916
5-1	295	23 400	3.9	901
6-0	354	28 290	3.9	1,115
7-2	[illegible]	23 [illegible]	4.0	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Lifetime		226 [illegible]M	3.9%	8,824F
Cow Index		+712M	+$82	+32F

Sire

Excellent (90) Gold Medal 5 75
USDA Sire Summary (June 1979)
5 480 Dtrs (1 869 Herds) 16 407M 3.6 % 589F
Predicted Difference +1 [illegible]M -.04% [illegible]
Repeatability [illegible] Dollar Difference +$140
HFAA Type Summary (July 1979)
1 794 Class Dtrs Avg 81 0 SC 80 7 AASC
PDT (99% Rpty) +0 66

Dam

Very Good [illegible] Gold Medal Dam

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4-9	304	15 989	3.4	580
5-8	274	16 330	3.3	542
6 9	305	20 2??	3.5	701
9 4	365	[illegible]	[illegible]	672
Lifetime		171 [illegible]M	3.5%	5,841F

Grand Sire

Excellent - Gold Medal 2 7?
USDA Sire Summary (July 19??)
977 Dtrs ([illegible] Herds) [illegible] [illegible] [illegible]
Pred Diff (98% Rpty) + 11M -.05% -6F
HFAA Type Summary (July 1979)
954 Class Dtrs Avg 84 6 SC 84 0 AASC
PDT (99% Rpty) +2 27

Grand Dam

Excellent (92 2E) Excellent Mammary

4-5	362d	16 569M	3.8%	622F
5-7	330	14 301	3.8	[illegible]
6-8	282	14,994	3.6	547
7-8	365	21,477	3.6	[illegible]
9-1	305	20 070	3.6	[illegible]
10-2	365	21 373	3.7	[illegible]
Lifetime		[illegible]	3.7%	[illegible]

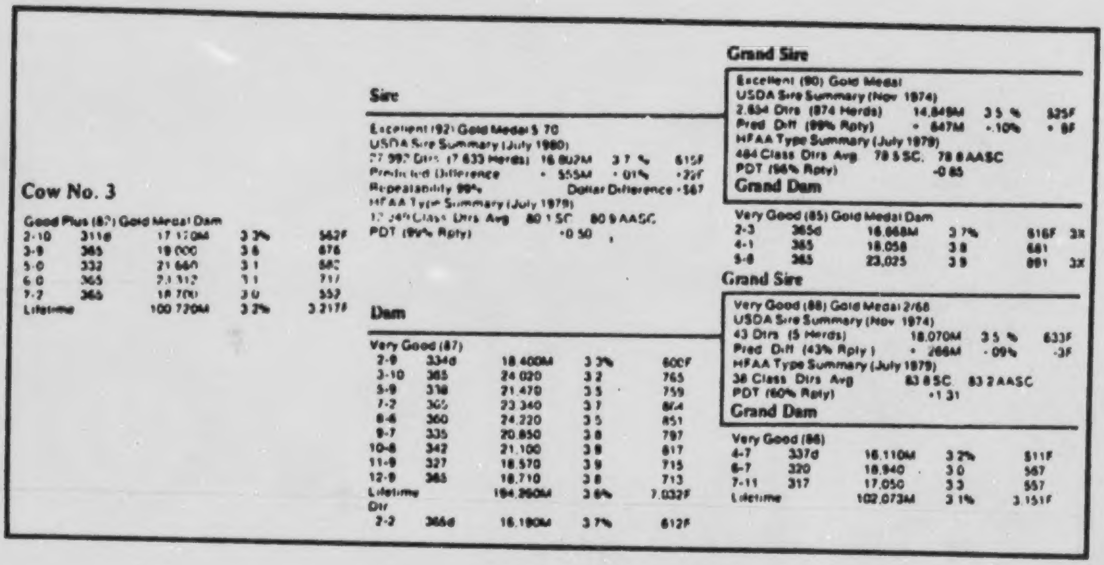
Grand Sire

Very Good (85)
USDA Sire Summary (Nov 1974)
12,868 Dtrs (3 204 Herds) 15,452M 3.6 % 557F
Pred Diff (99% Rpty) + 684M [illegible] [illegible]
HFAA Type Summary (July 1979)
[illegible] Class Dtrs Avg [illegible] [illegible]
PDT (99% Rpty) -0 42

Grand Dam

2-0	319d	[illegible]	3.4%	[illegible]
3-0	347	20,875	3.6	[illegible]
4-1	365	22,363	3.6	807
6-0	365	26,687	4.0	1,050
7-2	301	26,640	3.3	879
Lifetime		130 489M	3.6%	4,564F
Cow Index		+1,030M	+$96	+34F

Information Sheet II-4-D
(cont'd)



Cow No. 3

Good Plus (87) Gold Medal Dam

2-10	311d	17,170M	3.3%	562F
3-9	365	19,000	3.6	676
5-0	332	21,660	3.1	682
6-0	365	23,312	3.1	717
7-2	365	18,700	3.0	552
Lifetime		100,720M	3.2%	3,217F

Sire

Excellent (92) Gold Medal 5 70
USDA Sire Summary (July 1980)
27,992 Dtrs (7,633 Herds) 16,802M 3.7 % 615F
Predicted Difference + 555M +.01% +22F
Repeatability 99% Dollar Difference +$67
HFAA Type Summary (July 1979)
12,349 Class Dtrs Avg 80.1 SC 80.9 AASC
PDT (99% Rpty) +0.50

Grand Sire

Excellent (90) Gold Medal
USDA Sire Summary (Nov 1974)
2,654 Dtrs (874 Herds) 14,849M 3.5 % 525F
Pred Diff (99% Rpty) + 647M +.10% + 8F
HFAA Type Summary (July 1979)
484 Class Dtrs Avg 78.5 SC. 78.8 AASC
PDT (96% Rpty) -0.85

Grand Dam

Very Good (85) Gold Medal Dam

2-3	365d	16,668M	3.7%	616F	3X
4-1	365	18,058	3.8	681	
5-8	365	23,025	3.9	891	3X

Dam

Very Good (87)

2-9	334d	18,400M	3.3%	600F
3-10	365	24,020	3.2	765
5-9	318	21,470	3.5	759
7-2	365	23,340	3.7	864
8-4	360	24,220	3.5	851
9-7	335	20,850	3.8	797
10-8	342	21,100	3.9	817
11-9	327	18,570	3.9	715
12-9	365	18,710	3.8	713
Lifetime		194,260M	3.6%	7,032F
Dtr				
2-2	366d	16,190M	3.7%	612F

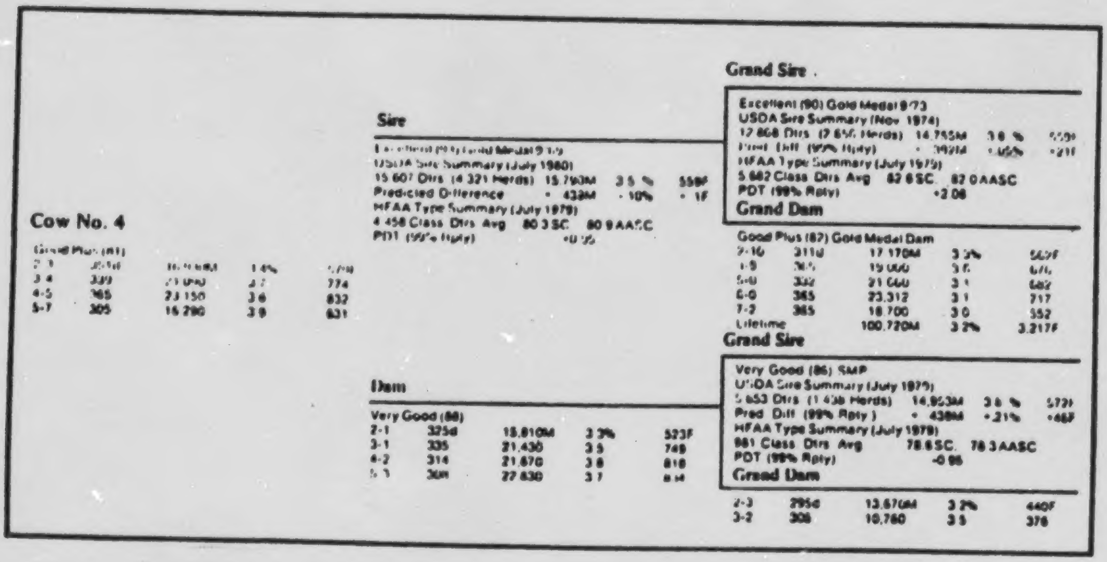
Grand Sire

Very Good (88) Gold Medal 2/68
USDA Sire Summary (Nov 1974)
43 Dtrs (5 Herds) 18,070M 3.5 % 633F
Pred Diff (43% Rpty) + 266M -.09% -3F
HFAA Type Summary (July 1979)
38 Class Dtrs Avg 83.8 SC 83.2 AASC
PDT (60% Rpty) +1.31

Grand Dam

Very Good (86)

4-7	337d	16,110M	3.2%	511F
6-7	320	18,940	3.0	567
7-11	317	17,050	3.3	557
Lifetime		102,073M	3.1%	3,151F



Cow No. 4

Good Plus (81)

2-3	[illegible]	[illegible]	[illegible]	[illegible]
3-4	339	21,[illegible]	[illegible]	774
4-5	365	23,150	3.6	832
5-7	305	16,290	3.9	631

Sire

[illegible] Gold Medal 9 [illegible]
USDA Sire Summary (July 1980)
15,607 Dtrs (4,321 Herds) 15,793M 3.5 % 558F
Predicted Difference + 432M -.10% + 1F
HFAA Type Summary (July 1979)
4,458 Class Dtrs Avg 80.3 SC 80.9 AASC
PDT (99% Rpty) +0.[illegible]

Grand Sire

Excellent (90) Gold Medal 9/73
USDA Sire Summary (Nov 1974)
17,868 Dtrs (2,65[illegible] Herds) 14,755M 3.8 % [illegible]
Pred Diff (99% Rpty) + [illegible] +.05% +21F
HFAA Type Summary (July 1979)
5,682 Class Dtrs Avg 82.6 SC. 82.0 AASC
PDT (99% Rpty) +2.08

Grand Dam

Good Plus (87) Gold Medal Dam

2-10	311d	17,170M	3.3%	562F
3-9	365	19,000	3.6	676
5-0	332	21,660	3.1	682
6-0	365	23,312	3.1	717
7-2	365	18,700	3.0	552
Lifetime		100,720M	3.2%	3,217F

Dam

Very Good (88)

2-1	325d	15,810M	3.3%	523F
3-1	335	21,430	3.5	749
4-2	314	21,670	3.8	818
5-3	308	22,630	3.7	[illegible]

Grand Sire

Very Good (86) SMP
USDA Sire Summary (July 1979)
5,653 Dtrs (1,436 Herds) 14,953M 3.8 % 572F
Pred Diff (99% Rpty) + 438M +.21% +48F
HFAA Type Summary (July 1979)
981 Class Dtrs Avg 78.6 SC. 78.3 AASC
PDT (99% Rpty) -0.95

Grand Dam

2-3	295d	13,670M	3.2%	440F
3-2	308	10,760	3.5	378

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 5: Selecting and Judging Swine

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify the characteristics of market and breeding swine of today in response to the demand for high percent of red meat and low fat.

2. Specific:

a. Identify new terms.
b. Identify primal cuts.
c. Describe the ideal animal.
d. List production record programs.
e. List the traits of quality breeding stock.
f.

g.

h.

B. Review Teaching Material

1. Hunsley, Roger E., W. Malcolm Beeson, and Julius E. Nordby. Livestock Judging, Selection and Evaluation. Danville: Interstate Publishers, 1978.

2. Animal Science 2, LSU Cooperative Extension Service, Publication 1764.

3. Livestock Judging Bulletin, State Department of Education Number 1546.

C. Special Arrangements

1. Materials

    a. Sample pedigrees
    b. Pork chart (retail cuts)
    c. Newspapers
    d. Electric skillet
    e. Food scales
    f. Transparencies

2. Field trips (slaughter house, wholesale distributor, retail store).

3. Films of selecting and judging swine.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Weigh out a pound of bacon before the class. Fry the bacon to remove fat. Weigh the cooked-out fat and remaining bacon. Discuss the trend in swine production aiming at less fat.

B. Content Outline

1. Terms

a. Primal cuts -- The most valuable wholesale meat cuts (ham, loin, Boston butt, picnic).

b. Teat placement -- The placement of teats on a sow's underline; evenly spaced.

c. Blind teats -- A teat on a sow that is not connected with the milk gland and will not produce milk.

d. Rudimentaries -- The teats on a boar.

e. Soundness of legs -- Desirable feet and legs of breeding stock.

f. Production registry -- Program to test the productive ability of swine; testing number of pigs farrowed, litter weight, and birth weight.

g. Litter -- The offspring at one birth of a multiparous animal.

h. Certified litter -- A litter of pigs meeting the production requirements as established by a breed association.

i. Certified sow -- A sow that has met the production requirements as established by a breed association.

j. Certified boar -- A boar that has sired several animals meeting the requirements for a certification as established by a breed association.

k. Certified mating -- The mating of a certified boar to a certified sow.

l. Pedigree -- A table presenting a line of ancestors for an animal.

2. Characteristics of the meat-type hog
    - a. Yield 50% of live weight in primal cuts
    - b. Weigh 200-210 lbs. at 5½ months of age
    - c. Backfat thickness less than 1½ inches
    - d. Loin eye 4 square inches or more
    - e. Feed conversion of one pound gain to 3½ pounds or less of feed
    - f. Females produce and raise eight or more pigs per litter (Transparency II-5-A)
3. Wholesale cuts of pork (Transparency II-5-G)
    - a. Make up 45.5% of live weight
    - b. Primal cuts represent 75% of retail value of the hog
    - c. Shoulder -- 23% of carcass
    - d. Loin -- 20% of carcass
    - e. Bacon -- 17% of carcass
    - f. Ham -- 22-28% of carcass
4. Characteristics of ideal meat-type hog (Transparency II-5-E)
    - a. Even arch over a strong-muscled back
    - b. Trim jowl
    - c. Trim underline
    - d. Firm finish
    - e. Good width between the front and hind legs
    - f. High lean-to-fat ratio
    - g. Swine grading card (Handout II-5-I)

5. Characteristics of breeding stock (select animals with same characteristics as a desirable market hog) (Transparency II-5-D)

   a. Gilts and sows -- check teat placement, blind teats and number of teats

   b. Boars -- check rudimentaries; there should be at least 12 teats evenly placed

6. Production records as a basis of selection

   a. Sound production information coupled with competent visual appraisal permits accurate selection of animals

   b. A profitable selection program must be based on the ability of an animal to produce

      1) Production registry
      2) Meat-type certification
      3) On-the-farm performance testing (sow record transparency II-5-F)
      4) Gilt selection programs

   c. Heritability of economically important traits is a performance factor. Carcass traits with high heritability are improved through individual selection of superior boars and gilts. Traits low in heritability are improved most through management, crossbreeding, proper nutrition, health, and using superior boars (Transparency II-5-H).

7. Pedigree as a basis of selection

   a. Lends confidence in projecting how well young animals will perform when selected as breeding stock.

   b. Breeding boar should always be purebred.

   c. Indicate if animal qualifies for production registry (PR), certified meat line (CML), or certified litter (CL).

   d. Is of utmost value when one is familiar with individual animals which make up the pedigree.

C. Suggested Student Activities

1. Bring to class newspaper advertisements stating prices of retail cuts.
2. Conduct a class survey to determine those cuts preferred.
3. Prepare a list of jobs other than farming related to the pork industry.
4. Write the Cooperative Extension Service for current information on existing testing programs in Louisiana.
5. Present an oral presentation on curing and smoking pork.
6. Compare the modern meat-type hog to the lard-type of the past.
7. Take classes to visit livestock shows.

D. Suggested Study Questions

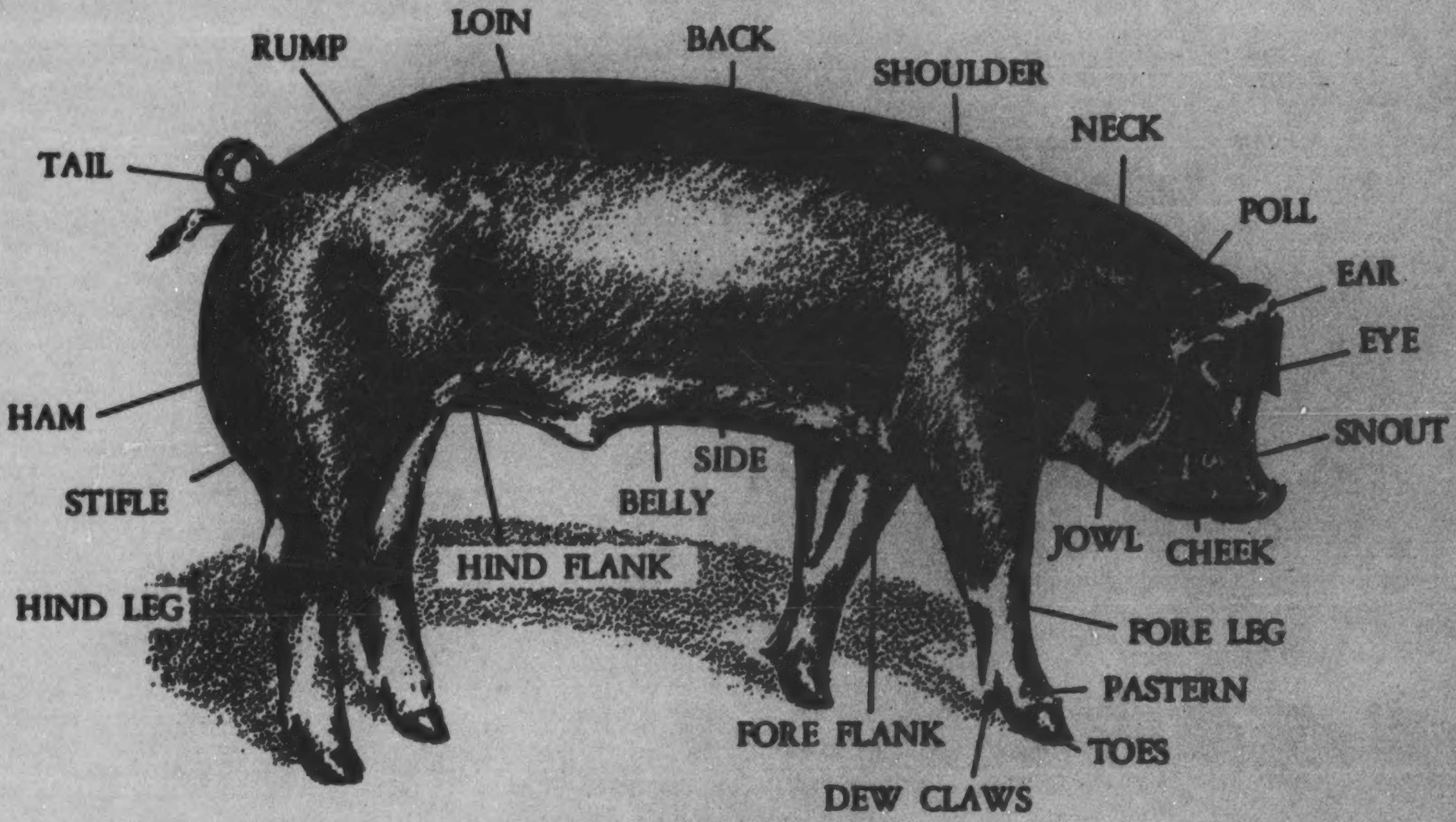
1. Define all terms in the lesson.
2. Name the primal cuts of pork.
3. Describe the ideal market hog.
4. Explain the importance of keeping good production records.
5. List the traits of quality breeding stock in swine production.
6. Name the characteristics of an ideal meat-type hog.

CHARACTERISTICS OF MEAT TYPE HOGS

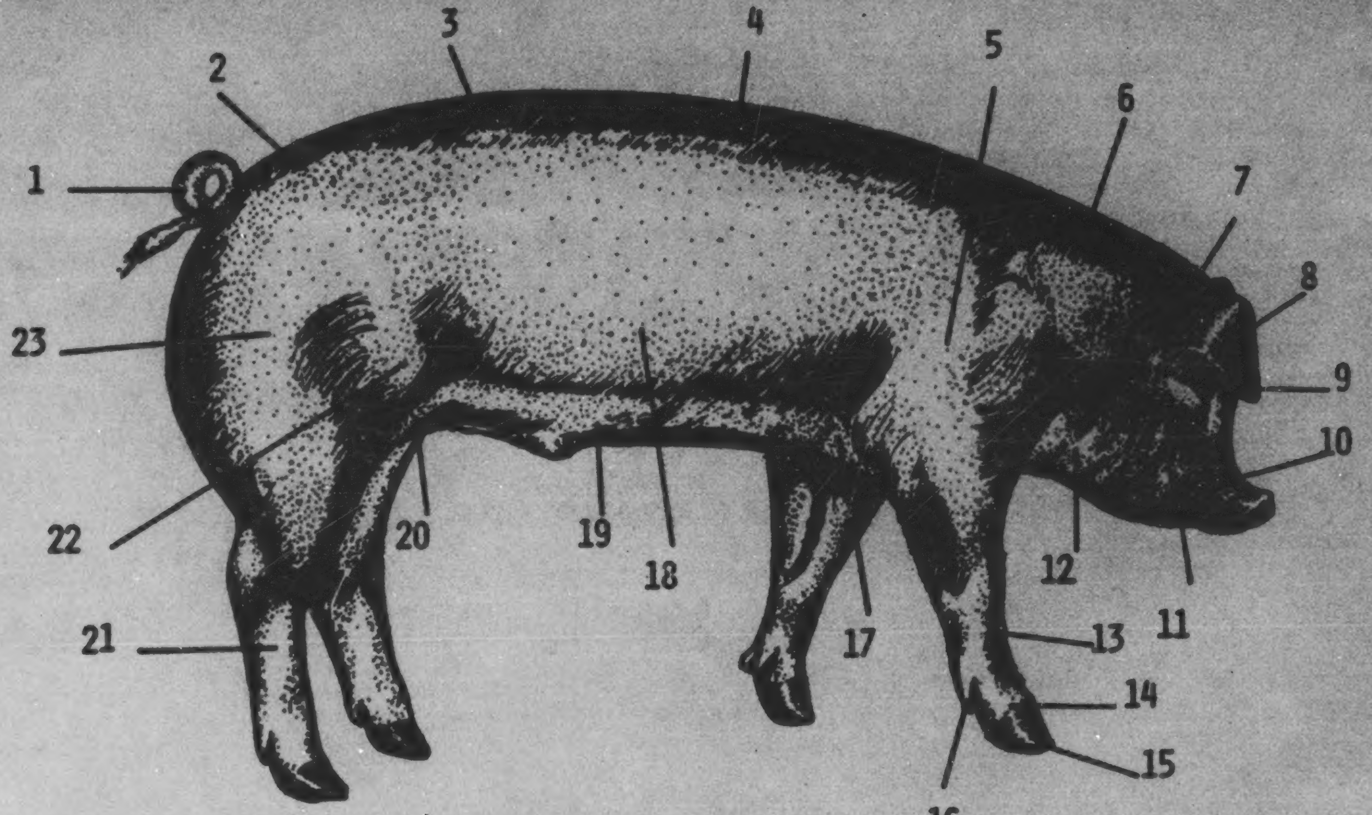
1. YIELD 50% OF LIVE WEIGHT IN PRIMAL CUTS: HAM, LOIN, PICNIC, AND BOSTON BUTT
2. WEIGH 200 TO 210 POUNDS AT 5½ MONTHS OF AGE
3. BACKFAT THICKNESS LESS THAN 1.5 INCHES
4. LOIN EYE 4 SQ. INCHES OR MORE
5. FEED CONVERSION OF 1 POUND GAIN TO 3.5 POUNDS OR LESS OF FEED
6. FEMALES PRODUCE AND RAISE 8 OR MORE PIGS PER LITTER

Transparency II-5-A

PARTS OF A HOG


LOIN
RUMP
BACK
SHOULDER
NECK
TAIL
POLL
EAR
EYE
HAM
SNOUT
SIDE
STIFLE
BELLY
JOWL
CHEEK
HIND FLANK
HIND LEG
FORE LEG
PASTERN
FORE FLANK
TOES
DEW CLAWS

Transparency II-5-B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PARTS OF A HOG

1 ____________________
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23 ____________________

Transparency II-5-C

SWINE JUDGING CARD

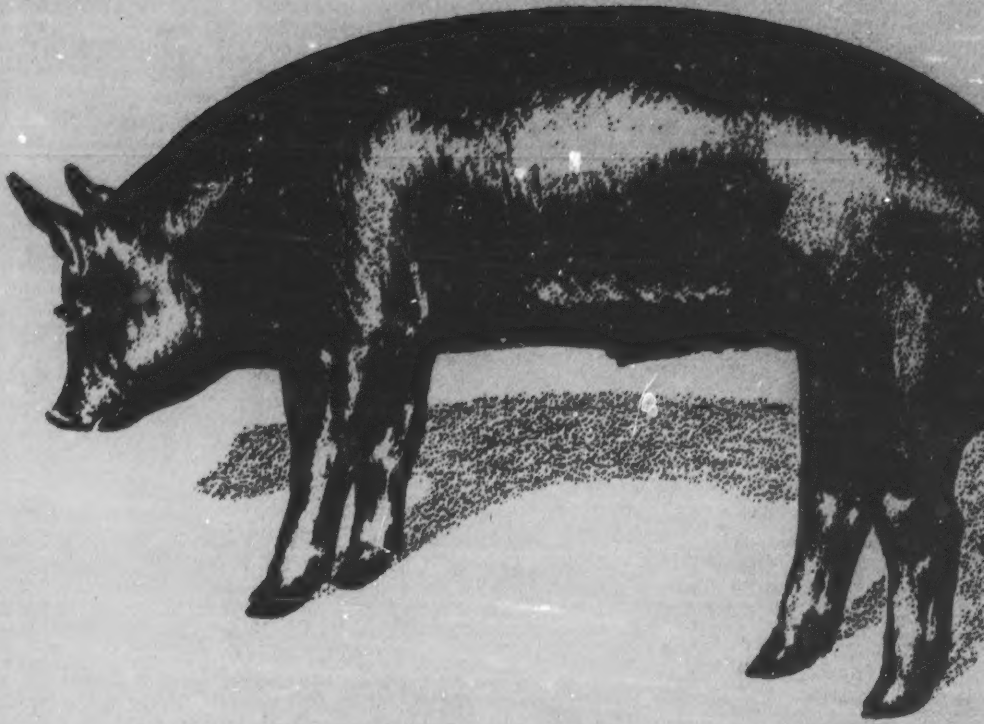
Points to Consider	Placing			
	1st	2nd	3rd	4th
I. General Appearance: moderately wide, thick meaty, muscular top; long, smooth side; strong, uniform arch; adequate depth of body standing on ample length of leg; deep, thick, meaty ham with moderate length of shank; smooth shoulder, clean over the top and behind the shoulders; extreme spring to the fore-rib and rear rib; long, deep loin; long rump with a tremendous flare to the ham; neat, lean and trim in the head, neck jowl, along the underline, in the rear flank, at the base of the ham in the crotch area; and sound, well-placed feet and legs.				
II. Form: 1. Head and neck-broad, clean-cut and neat; large, prominent eyes; wide forehead; medium-sized ears (should be representative of the breed); neat, trim jowl and cheek and a moderately long, well-developed snout. Neck should be medium length and blend smoothly with the shoulder. (In breeding classes, breed type and character should be considered.)				
2. Shoulders - smooth, clean over the top (free of excess finish), neatly laid in, possessing the same width and depth as the rest of the body. Should show evidence of muscling in the shoulder and movement of the shoulder blade when the animal is walking.				

Points to Consider	Placing			
	1st	2nd	3rd	4th
II. Form: (Continued)				
3. Back and loin-wide, thick, meaty with good length, a strong arch, being firm and extremely heavily muscled				
4. Sides-long, firm, moderately deep, clean and neat in the flanks and free from creases and wrinkles				
5. Belly - trim, clean, firm, straight - not flabby. (In breeding gilts and sows, there should be at least six well-spaced, properly developed teats on each side of the underline.).				
6. Rump - long, thick and muscular, indicating an extreme flare out from the loin and a high tail setting				
7. Ham - deep, thick, meaty, showing outstanding muscle development through the stifle and in the inner and outer portions. Clean and free of excessive fat cover at the base and in the crotch area. Should be firm, clean and heavily muscled, not flabby or wrinkled				
8. Feet and legs - should stand on plenty of hard, clean, heavy bone and on moderate (or above) length of leg. Legs should be set straight, wide apart and well placed on the corners of the body. Joints should be clean, pasterns strong and upright and toes not spreading and of equal size. (Feet and legs of minor importance in placing market hogs.).				

Transparency II-5-D
(cont'd)

Points to Consider	Placing			
	1st	2nd	3rd	4th
III. Finish: a minimum amount of smooth finish uniformly distributed over the entire body. Overly fat, wasty hogs are undesirable. (Breeding hogs only need to carry enough finish to show the essential features to the best advantage.)				
IV. Quality: smoothness in finish and body form: free from wrinkles and flabbiness; clean about the joints and hocks; refinement of hair, hide, bone, head and ear. . .				
V. Dressing Percentage: a minimum amount of firm, smooth finish; heavy muscling; high quality and trim middles result in high dressing percentage.				
VI. Balance: harmonious and symmetrical unity of all parts.				
VII. Breed and Sex Character: as indicated by strong head, style and breed type characteristics and ample masculine or feminine sex characters. (Breeding swine only.) . .				

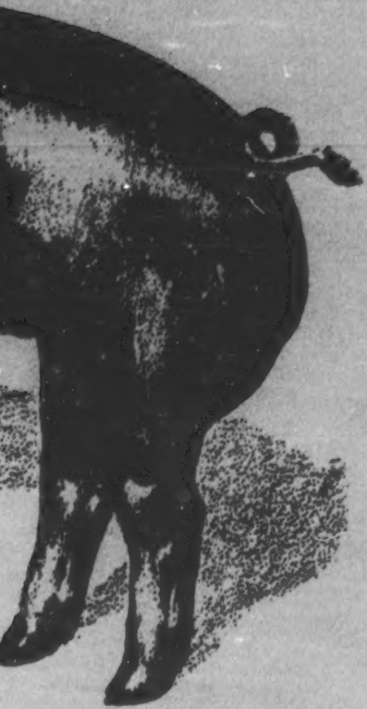
IDEAL SWINE CONFORM

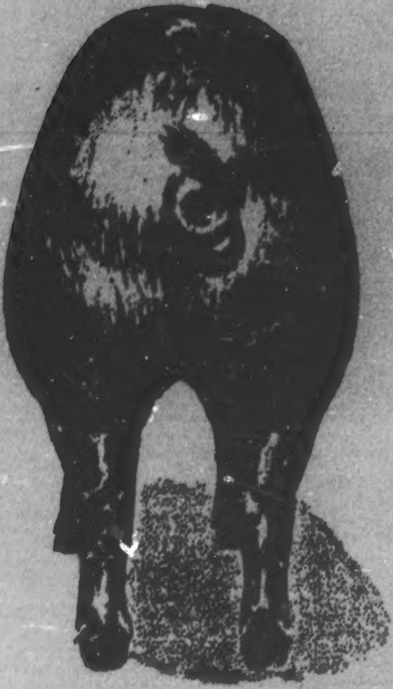


SIDE VIEW

Transparency II-5-E

CONFORMATION





REAR VIEW

SOW RECORD

SOW NO. ______________

SOW'S ___________ LITTER
(1, 2, etc.)

R
L
EAR NOTCH

BIRTH DATE OF SOW ______________________

180-DAY WT. _____ 200 LB. PROBE ___ FEED/100 LB. GAIN _______

FARROWING DATE ______________

TOTAL FARROWED......... MALE _____ FEMALE ___

FARROWED ALIVE......... MALE _____ FEMALE ___

TOTAL WEANED.......... MALE _____ FEMALE ___

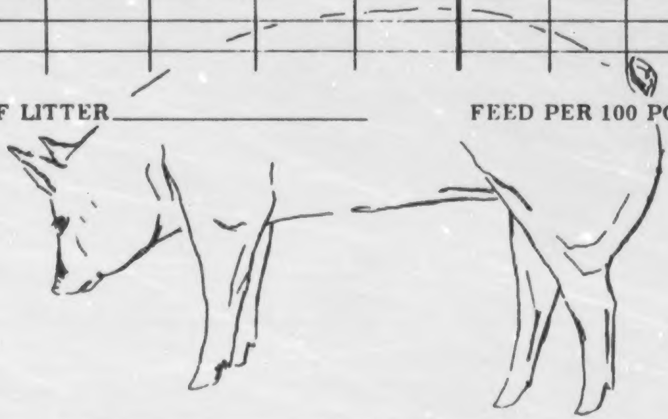
_____ DAY LITTER WT. ______________
21, 35, 56, etc.

NAME ____________________ REG. NO. __________ BOAR NO. ______________

BREED ______________________________ BREED ______________

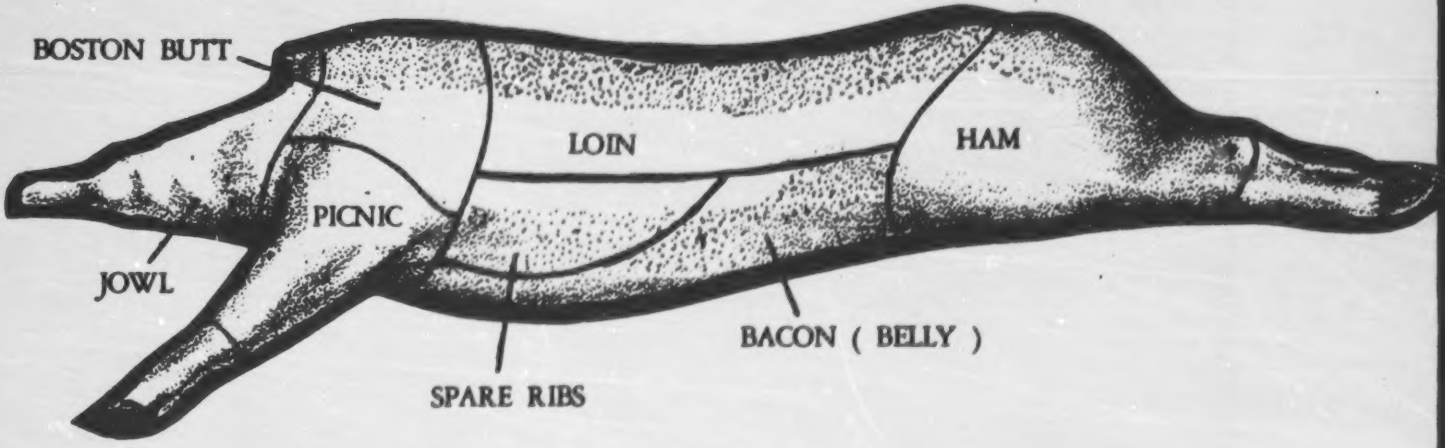
EAR NOTCH		PIG NO.	SEX	BIRTH WEIGHT	WEANING WEIGHT (OPTIONAL)	AGE WEIGHED _____ DAYS		BACKFAT PROBE					REMARKS
R	L					ACTUAL WT.	ADJ. 154 DAY WT.	SHLDR. IN.	BACK IN.	LOIN IN.	AV. IN.	ADJ. TO 200 LB.	

AV. 154-DAY WT. OF LITTER ______________ FEED PER 100 POUNDS GAIN ______________



Transparency II-5-F

WHOLESALE CUTS OF PORK


BOSTON BUTT
LOIN
HAM
PICNIC
JOWL
BACON (BELLY)
SPARE RIBS

TRANSPARENCY II-5-6

SWINE HERITABILITY ESTIMATES

TRAITS	APPROXIMATE HERITABILITY (PERCENTAGE)	
Productive traits:		
LITTER SIZE AT BIRTH	5-15	LOW
LITTER SIZE AT WEANING	5-15	
LITTER WEANING WEIGHT	10-20	
Feedlot traits:		
POST WEANING GAIN	25-35	MEDIUM
FEED PER UNIT GAIN	30-40	
Carcass traits:		
LENGTH	50-60	HIGH
BACKFAT THICKNESS	45-55	
LOIN EYE AREA	45-55	
YIELD OF LEAN CUTS	35-45	

Information Sheet II-5-A

LIVESTOCK JUDGING CONTEST

Purpose: Livestock judging involves beef cattle, swine, and sheep. The ability to judge livestock is one of the most essential and constantly used talents of the livestock person. The practical person must be a good feeder, a devoted caretaker, a skillful breeder and must know how to buy and sell to the best advantage. The ability to judge is the basis of success in all of these phases of livestock production. Even though considerable emphasis is placed on competitive judging and judging contests, this is not the most important purpose for learning to judge livestock. The development of livestock judging teams and judging contests aids in training young men and women to be able to select and improve breeds of livestock.

Rules and regulations:

1. Using form 2 (or computer card)

   A. At least four of the following classes of animals will be placed: breeding cattle, market cattle, breeding sheep, market sheep or lambs, market swine and breeding swine.
   B. Contestants will have 12 minutes to place each class.
   C. At lease one class from A. above will be designated as an oral reason class before the judging begins and participants will be notified.

2. Oral Reasons:

   A. Contestants will have 12 minutes to place the class and 5 extra minutes to prepare reasons.
   B. A maximum of 2 minutes will be allowed to give reasons.
   C. Contestants may use the placing card in delivering reasons; no other notes will be permitted.
   D. Reasons will be scored on the basis of 50 points for a perfect score.
   E. The State Staff and University personnel will determine the cut-off point as to which teams will be required to deliver oral reasons at all area contests.
   F. All sixteen teams will be required to deliver oral reasons at the State Contest.

3. Using Form 12:

   A. A maximum of one class of market swine consisting of no more than 10 head may be graded individually according to the latest US market grades.
   B. All grades will not necessarily be represented.
   C. For most current information, copies of standards and posters (large and small) illustrating these grades, write to Livestock-Poultry-Grain and Seed Division, Agricultural Marketing Service, USDA, Washington, D.C. 20250. Extension Folder 436, Pork Carcass and Slaughter Swine Grading, Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108.

Information Sheet II-5-A
(cont'd)

4. **Using Form 13:**

   A. **A maximum of one class of slaughter cattle may be graded individually according to the latest US market grades.**
   B. **The slaughter class may also be graded according to cutability.**
   C. **Refer to Bulletin No. 4 to order reference material.**

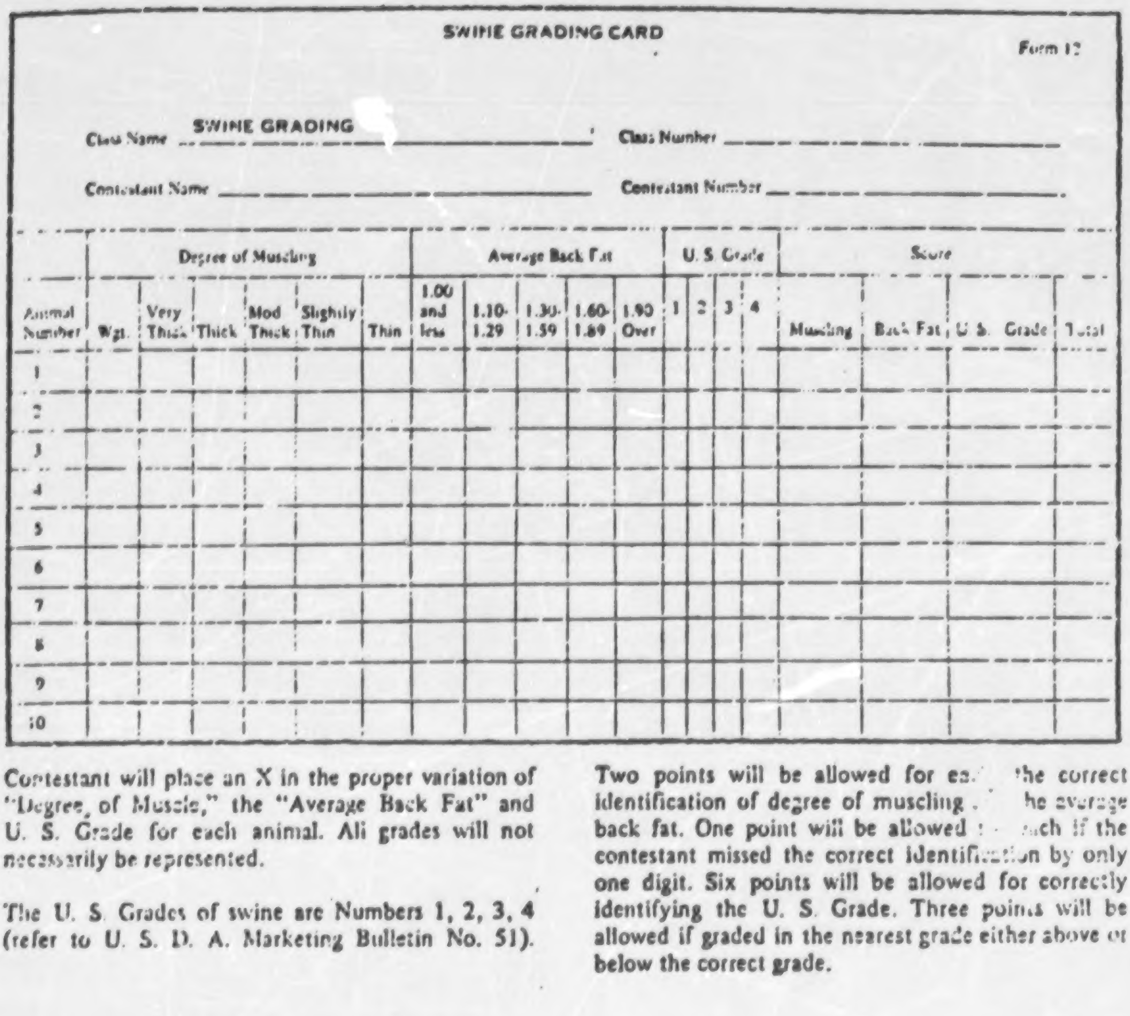
5. **Using Form 13A:**

   A. **A maximum of one class of no more than 10 feeder cattle may be graded according to the latest US market grades.**
   B. **More than one breed may be used in each class.**
   C. **Refer to Bulletin No. 4 to order reference material.**

6. **Using Form 13B:**

   A. **Female selection classes, one in beef and/or one in swine, made up of a maximum of eight animals may be used.**
   B. **Contestants will be required to select the four best animals from the eight, using visual appraisal and performance data.**
   C. **Performance data to be provided orally or in writing includes:**
      both beef and swine--weight for age
      beef--adjusted 205 days weaning weights
      swine--days for 230 pounds, estimated B.F. (inches), loin eye area (square inch)
   D. **Contestants will be allowed 15 minutes for each class.**

Information Sheet II-5-B



SWINE GRADING CARD

Form 12

Class Name SWINE GRADING ______________________ Class Number ______________________

Contestant Name ______________________ Contestant Number ______________________

	Degree of Muscling						Average Back Fat					U. S. Grade				Score			
Animal Number	Wgt.	Very Thick	Thick	Mod Thick	Slightly Thin	Thin	1.00 and less	1.10-1.29	1.30-1.59	1.60-1.89	1.90 Over	1	2	3	4	Muscling	Back Fat	U. S. Grade	Total
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Contestant will place an X in the proper variation of "Degree of Muscle," the "Average Back Fat" and U. S. Grade for each animal. All grades will not necessarily be represented.

The U. S. Grades of swine are Numbers 1, 2, 3, 4 (refer to U. S. D. A. Marketing Bulletin No. 51).

Two points will be allowed for each of the correct identification of degree of muscling and the average back fat. One point will be allowed for each if the contestant missed the correct identification by only one digit. Six points will be allowed for correctly identifying the U. S. Grade. Three points will be allowed if graded in the nearest grade either above or below the correct grade.

Information Sheet II-5-D

Form 13B

FFA LIVESTOCK CONTEST

FEMALE SELECTION CLASS____

CONTEST NAME____

CONTESTANT NUMBER____

Circle the numbers of the four animals you want to keep

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8

Contestants will list the numbers of the four animals they select for replacements.

Contest officials will assign a point value to each one of the individual animals, giving the most points to the most desirable animal and the least points to the least desirable animal. If the contestant selects the best four animals full credit will be given.

SAMPLE FOR SCORING

Animal Numbers

8	7	6	5	4	3	2	1	Sample Class
(18)	(13)	(11)	(8)	(7)	(4)	(3)	(0)	Point Values

Animal Numbers Selected

					Score
Student A	^{6}(11)	^{8}(18)	^{4}(7)	^{2}(3)	39
Student B	^{8}(18)	^{7}(13)	^{6}(11)	^{5}(8)	50
Student C	^{7}(13)	^{6}(11)	^{5}(8)	^{1}(0)	32

Point values shown in Parentheses Point Values are established by official judges and will differ on each class.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 6: Selecting and Judging Poultry

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify those methods of selection and culling to assure the availability of poultry for the producer and increase net profit by securing maximum production while incurring minimum expense.

2. Specific:

a. Identify new terms.
b. List the types of poultry producers.
c. Identify the factors to consider in culling laying hens.
d. Identify the factors for evaluating hens based on present and past egg production.
e. Identify factors to consider for selecting broiler market qualities.
f.

g.

h.

B. Review Teaching Materials

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Judging Poultry, LSU Cooperative Extension Service, Publication 1483

3. Animal Science 2, LSU Cooperative Extension Service, Publication 1764

4. Poultry Judging Bulletin, State Department of Education, No. 1545

85 C. Special Arrangements

1. Materials

   a. Teacher-prepared transparencies
   b. Available charts
      1) Parts
      2) Conformation
      3) Ready-to-cook
   c. Overhead projector

2. Visit a poultry farm to demonstrate how to select a good layer.

3. Show film on judging and selecting poultry.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Secure an example picture of a living specimen and compare with the processed product to be displayed for the following:

1. Broiler-fryer
2. Roaster
3. Capon
4. Hen, stewing chicken, stewing fowl, cock or rooster

B. Content Outline

1. Terms
   - a. Straight-run chicks -- Chicks of both sexes in the order in which they hatch; chicks hatch in about equal numbers of both sexes.
   - b. Sexed females -- Chicks that have been separated according to sex at hatching.
   - c. Cockerels -- A male fowl less than one year of age.
   - d. Broiler -- A young chicken usually 9-12 weeks of age used for meat purposes.
2. Types of poultry producers
   - a. Commercial egg producers
   - b. Hatching egg producers (producing broiler chicks and egg producing chicks)
   - c. Broiler producers
   - d. Pullet producers
3. Factors to consider in selecting pullets (Transparency II-6-A,B,C&H)
   - a. Head
   - b. Sexual maturity
   - c. Body conformation
   - d. Plumage condition and skin color
   - e. Feet and toes
   - f. Comparison of desirable and undersirable characteristics
4. Factors to consider in selecting flock replacements (Transparency II-6-C)
   - a. Back
   - b. Breast
   - c. Legs, thighs, and shanks
   - d. Feet and toes
   - e. Neck
   - f. Wings
   - g. Plumage (condition and vigor)
   - h. Other defects
5. Factors to consider in separating layers and nonlayers as well as high and low producers (Transparency II-6-D)

6. Evaluating hens for present and past egg production (Transparency II-6-E)
    a. Pigmentation
    b. Handling qualities
    c. Plumage condition
    d. Constitutional vigor and vitality
    e. Head characteristics

7. Summary of specifications for standards of quality for individual carcasses of ready-to-cook poultry (Transparency II-6-F)

8. Summary of United States standards for quality of individual shell eggs (Transparency II-6-G)

9. Methods of selection (retaining the best in the flock)
    a. Individual selection -- based on general appearance.
    b. Pedigree selection -- of importance when production data are not available.
    c. Family selection -- refers to the performance or appearance of the rest of the members of the family.
    d. Blood group systems -- used as a tool for obtaining greater insight concerning genetic mechanisms and for determining parentage.

C. Suggested Student Activities

1. Visit a hatchery or poultry farm and describe the process for incubating and hatching baby chicks.

2. Visit a poultry processing plant and describe the processing of poultry.

3. Visit a local supermarket and make a list of the ready-to-cook poultry available.

4. Determine the type of any poultry production in local area.

D. Suggested Study Questions

1. Define terms related to selecting and judging poultry.

2. Name the types of poultry producers in Louisiana.

3. Name the factors to consider when selecting pullets.

4. Name the factors to consider when selecting broilers.

5. Name the factors to consider when selecting replacements for production hens.

6. Describe the evaluation of hens for present and past egg production.

7. Explain the following methods of selection for egg production:

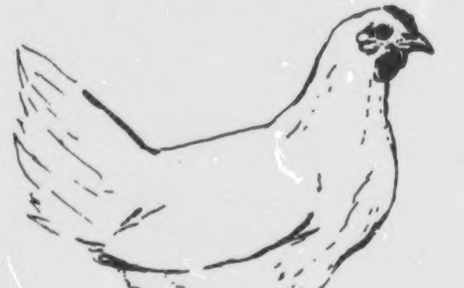
    a. Individual selection
    b. Pedigree selection
    c. Family selection
    d. Blood group systems

8. Give the standards of quality for ready-to-cook birds.

9. Give the standards of quality for shelled eggs.

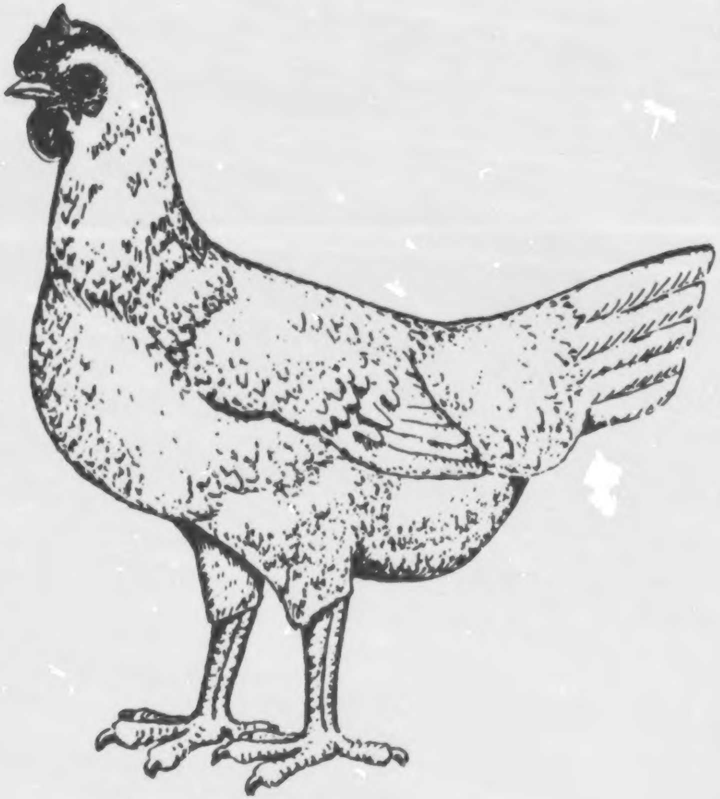
FACTORS TO CONSIDER IN SELECTING PULLETS

1. HEAD — STRONG, MODERATELY LONG, & WELL FILLED IN FORWARD TO THE EYES; THE COMB OF GOOD SIZE & SUBSTANCE & RICH IN COLOR; THE EYE SHOULD BE LARGE , BRIGHT, & PROMINENT.
2. SEXUAL MATURITY — WELL DEVELOPED COMB & HEAD; GROWTHINESS & RUGGEDNESS IN SKELETAL DEVELOPMENT AT EARLY AGE IS DESIRABLE.
3. BODY CONFORMATION — DEEP, BROAD, & WELL DEVELOPED WITH A LONG KEEL.
4. PLUMAGE CONDITION & SKIN COLOR — WITH GOOD QUALITY PLUMAGE & SHANKS SHOWING A RICH HEALTHY COLOR.
5. FEET & TOES — NORMAL DEVELOPMENT & WELL BALANCED ON LEGS.

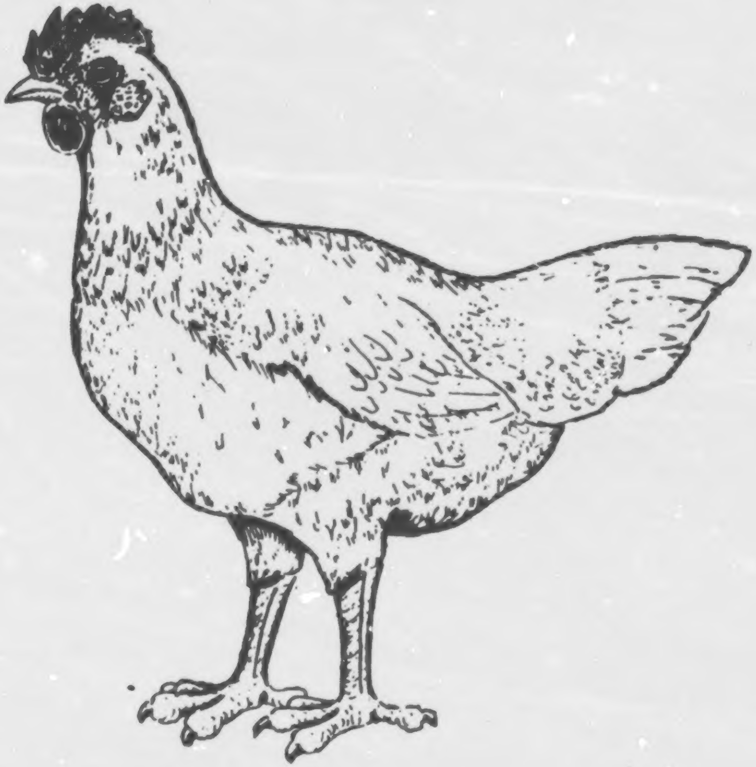


Transparency II-6-A

PULLET CONFORMATION



DESIRABLE



UNDESIRABLE

Transparency II-6-B

FACTORS TO CONSIDER IN SELECTING FLOCK REPLACEMENTS

❶ BACK - STRAIGHT, LONG, AND WIDE

❷ BREAST - BROAD, UNIFORM FLESHING

❸ LEGS, THIGHS, AND SHANKS - LEGS AND THIGHS WELL FLESHED; LEGS STRAIGHT

❹ FEET AND TOES - WELL FORMED, HEALTHY PADS ON FEET

❺ NECK - SMOOTH AND BLENDING WITH BODY

❻ WINGS - MUSCULAR, CLOSELY FOLDED

❼ PLUMAGE, CONDITION, AND VIGOR - WELL FEATHERED, HEALTHY, AND VIGOROUS

❽ OTHER DEFECTS - DEFORMED BEAK, BLIND EYE OR DISTORTED PUPIL, WRY OR CROOKED NECK, SPLIT WING, DEFORMED BACK, PERMANENT ABSENCE OF MAIN TAIL FEATHERS, CROOKED OR MALFORMED KEEL, CROOKED TOES (90% DEGREE ANGLE) OR DEFORMED FOOT, BREAST BLISTER ON KEEL, AND GREEN SHANKS.

Transparency II-6-C

FACTORS TO CONSIDER IN SEPARATING LAYERS AND NON-LAYERS

HANDY CULLING CHART[1]

Separating Layers and Nonlayers

Character	Layer	Nonlayer
Comb	Large, smooth, bright red, glossy.	Dull, dry, shriveled, scaly.
Face	Bright red.	Yellowish tint.
Vent	Large, smooth, moist.	Shrunken, puckered, dry.
Pubic bones	Thin, pliable, spread apart.	Blunt, rigid, close together.
Abdomen	Full, soft, pliable.	Contracted, hard, fleshy.
Skin	Soft, loose.	Thick, underlaid with fat.

Separating High and Low Producers

Character	High Producer (continuous laying)	Low Producer (brief laying)
Vent	Bluish white.	Yellow or flesh color.
Eye-ring	White	Yellow.
Earlobe	White	Yellow
Beak	White.	Yellow
Shanks	White, flattened	Yellow, round.
Plumage	Worn, soiled	Not much worn.
Molting	Late, rapid	Early, slow

Characteristics of Desirable Producers

Time of maturity	Leghorns begin to lay at 5 to 5½ months, Rhode Island Reds, Plymouth Rocks, and similar breeds, at 5 to 6½ months
Rate of production	Hens lay at least 220 eggs a year
Broodiness	Birds are seldom broody
Persistence of production	Good producers lay consistently for 12 to 15 months

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[1] From *Culling Hens* USDA Farmers Bull No 2216 p 10

Transparency II-6-D

EVALUATING HENS FOR RATE OF EGG PRODUCTION PAST AND PRESENT

1. PIGMENTATION — FADES AND RETURNS IN ORDER OF VENT, EYE RING , AND EAR LOBE (MEDITERRANEAN CLASS ONLY). ALSO BEAK, SHANKS, FEET, AND TOES.

2. HANDLING QUALITIES – WIDTH, DEPTH, AND PLIABLENESS OF ABDOMINAL SECTION; FLEXIBILITY AND SPREAD OF PELVIC BONES; AND ENLARGEMENT AND MOISTNESS OF VENT .

3. PLUMAGE CONDITION — PRESENCE OF MOLT CONDITION; ORDER OF MOLT - HEAD, NECK, BODY, WING, AND TAIL; FRAYED, WORN, OR SOILED PLUMAGE.

4. CONSTITUTIONAL VIGOR & VITALITY — FREEDOM FROM DISEASE, ACTIVE AND ALERT, STANDS ERECT AND DISPLAYS A HIGH DEGREE OF VIGOR AND VITALITY.

5. HEAD CHARACTERISTICS BROAD, DEEP, AND REFINED; COMB AND WATTLES - LARGE, PROMINENT, AND WAXY RED;EYES - BRIGHT AND ALERT

Transparency II-6-E

SUMMARY OF SPECIFICATIONS FOR STANDARDS OF QUALITY FOR INDIVIDUAL CARCASSES OF READY-TO-COOK POULTRY AND PARTS THEREFROM

(Minimum Requirements and Maximum Defects Permitted)

FACTOR	A QUALITY	B QUALITY	C QUALITY*
CONFORMATION:	Normal	Moderate deformities	Abnormal
Breastbone	Slight curve or dent	Moderately dented, curved or crooked	Seriously curved or crooked
Back	Normal (except slight curve)	Moderately crooked	Seriously crooked
Legs & wings	Normal	Moderately misshapen	Misshapen
FLESHING:	Well fleshed, moderately long, deep and rounded breast	Moderately fleshed, considering kind, class and part	Poorly fleshed
FAT COVERING:	Well covered - especially between heavy feather tracts on breast and considering kind, class, and part	Sufficient fat on breast and legs to prevent distinct appearance of flesh through the skin	Lacking in fat covering over all parts of carcass
DISJOINTED BONES	1	2 disjointed & no broken or	No limit
BROKEN BONES	None	1 disjointed & 1 non-protruding broken	No limit
MISSING PARTS	Wing tips and tail	Wing tips, 2nd wing joint & tail	Wing tips, wings and tail

*Carcasses below U.S. Grade C and unfit for human consumption are called "rejects."

Transparency II-6-F

SUMMARY OF UNITED STATES STANDARDS FOR QUALITY OF INDIVIDUAL SHELL EGGS

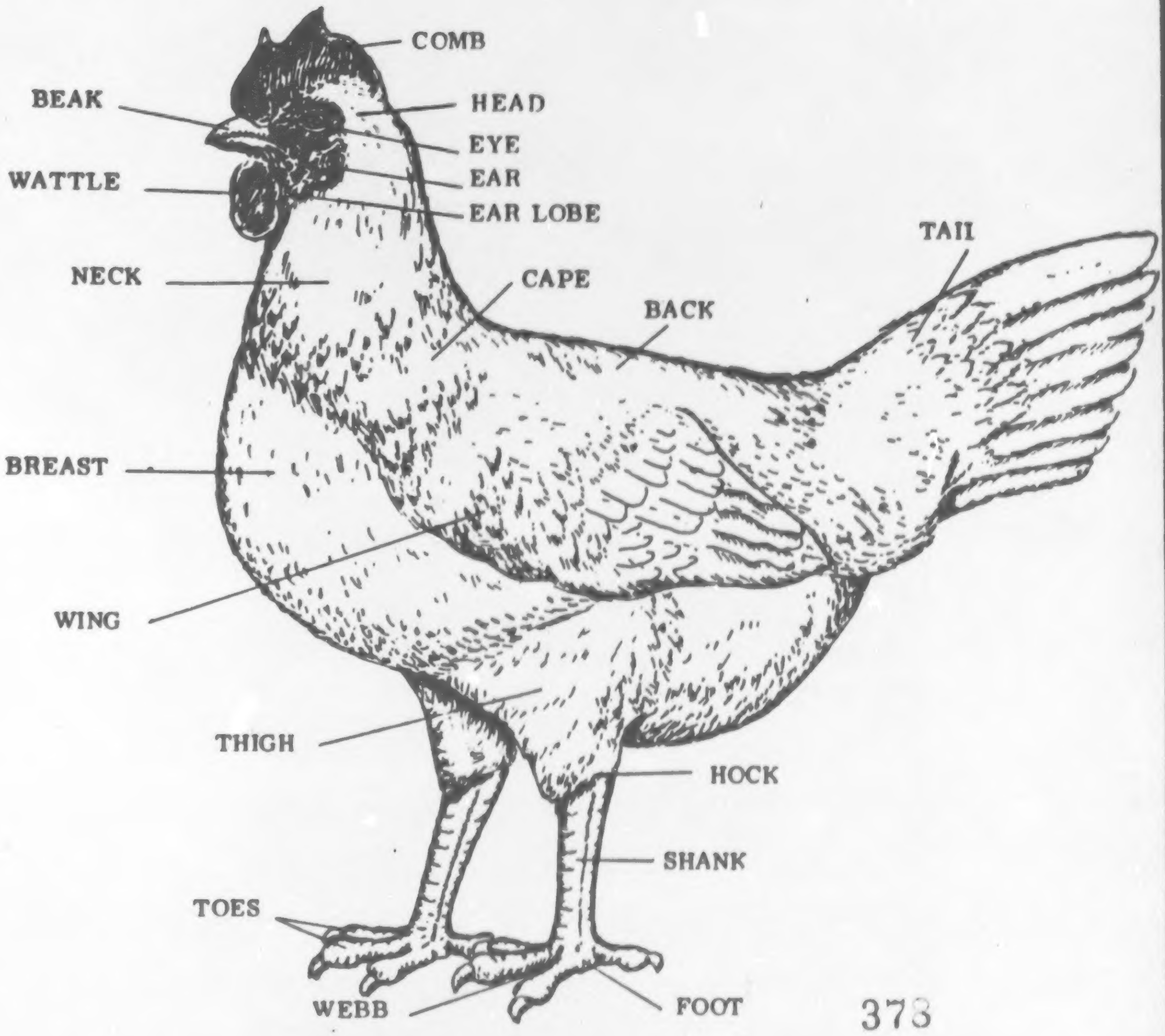
Specifications for Each Quality Factor

QUALITY	AA QUALITY	A QUALITY	B QUALITY	C QUALITY
SHELL	Clean. Unbroken. Practically normal in shape.	Clean. Unbroken. Practically normal in shape.	Clean to very slightly stained. Unbroken. May be slightly abnormal in shape.	Unbroken. May be abnormal in shape. May have slightly stained areas.*
AIR CELL	1/8" or less in depth. May show unlimited movement. May be free or bubbly.	3/16" or less in depth. May show unlimited movement and may be free or bubbly.	3/8" or less in depth. May be free or bubbly. May show unlimited movement.	May be over 3/8" in depth. May show unlimited movement. May be free or bubbly.
WHITE	Clear. Firm. (72 Haugh units or higher.)	Clear. May be reasonably firm. (60-72 Haugh units.)	Clear. May be slightly weak. (31 to 60 Haugh units.)	May be weak and watery. Small blood clots or spots may be present.* (Less than 31 Haugh units.)
YOLK	Outline slightly defined. Practically free from apparent defects.	Outline may be fairly well defined. Practically free from apparent defects.	Outline may be well defined. May be slightly enlarged and flattened. May show definite but not serious defects.	Outline may be plainly visible. May be dark, enlarged and flattened. May show clearly visible germ development but no blood. May show other serious defects. Small blood clots or sports may be present. (Not more than 1/8" in diameter in aggregate.)

Moderately stained areas are permitted if they do not cover more than 1/4 of the shell surface. Eggs having shells with prominent stains or adhering dirt are not permitted.

TERMS DESCRIPTIVE OF AIR CELL: (a) Free air cell. An air cell that moves freely toward the uppermost point in the egg as the egg is rotated slowly; (b) Bubbly air cell. A ruptured air cell resulting in one or more small separate air bubbles usually floating beneath the main air cell.

PARTS OF A CHICKEN


COMB
BEAK
HEAD
EYE
WATTLE
EAR
EAR LOBE
TAIL
NECK
CAPE
BACK
BREAST
WING
THIGH
HOCK
SHANK
TOES
WEBB
FOOT

Transparency II-6-H

POULTRY JUDGING CONTEST

Purpose: Poultry Judging is important to the producer as well as to the consumer. The producer must know how to select and produce good quality poultry and eggs and the consumer needs to know how to select the desired quality of meat and eggs.

Rules and Regulations:

1. Using Form 2 or Computer Score Card

   A. There may be two production classes of hens with four birds of the same breed in each class. (White leghorns or commercial strain of leghorn type - in breed cross.)
   B. There may be one production class of pullets, age 20 to 22 weeks, to be judged on the basis of potential productive capacity as layers. (White leghorns or commercial strain of leghorn type - in breed cross.)
   C. The birds may or may not be debeaked, decombed or have one clipped wing.

2. Oral Reasons: At least one set of oral reasons will be used; either one from the class of production pullets or one from a class of production hens.

   A. Contestants will have 12 minutes to place the class and 5 extra minutes to prepare reasons.
   B. No more than 2 minutes will be allowed in delivering reasons.
   C. Contestants may use the placing card in delivering reasons.
   D. No other notes will be permitted.
   E. Reasons will be scored on the basis of 50 points for a perfect score.
   F. University personnel will determine the class and number of classes for which reasons will be given.
   G. The reasons class or classes will be designated before the judging begins.

3. Using Form 9:

   A. There will be one class of 10 ready-to-cook broilers, fryers, or roasters, 1½ to 6 pounds in weight, to be graded according to quality.
   B. Pinfeathers and filoplumes (hair) will not be considered in grading.
   C. There may be one class of ready-to-cook turkeys (hens and/or toms) 8 to 14 pounds in weight.
   D. See the latest revised edition of the USDA Handbook No. 31 "Poultry Grading Manual."

4. Using Form 10A:

   A. There may be one class of 20 or fewer white or white-tint shell market eggs, to be graded for interior quality only.

5. Using Form 10B:

   A. There may be one class of 20 or fewer eggs which are to be graded as broken-out for market quality.

6. Using Form 10C:

   A. There may be one class of 20 or fewer eggs which are to be graded for exterior quality only.
   B. The eggs in the class to be graded for exterior quality only are not to be handled. They will be laid horizontally and decisions will be based on visible portions only.
   C. All classes will be graded in accordance with the latest revised edition of the United States Standards for Shell Eggs. These standards and a color chart illustrating standards of quality are available from Poultry and Dairy Quality Division, FSQS, USDA, Washington, D.C. 20250.

7. Special Note:

   A. Handling of live bird classes will be at the discretion of each university.
   B. Points may be deducted from a contestant's total score if he or she handles birds or eggs incorrectly.

SCORE CARD FOR ORAL REASONS ON PRODUCTION PULLETS AND ON PRODUCTION HENS

Scoring Factors	Point Value
1. DELIVERY AND APPEARANCE: (General neatness)	
A. Did contestant stand still on two feet and face the judges?	2
B. Did the contestant speak clearly, distinctly, and loud enough to be heard?	2
C. Did the contestant have an appropriate opening and closing sentence?	2
D. Did the contestant speak smoothly without long pauses?	2
E. Did the contestant have confidence? Was the contestant convincing?	4
TOTAL POINTS	12
2. PROPER USE OF TERMS	
A. For production hens the contestant should place the most emphasis on: 1. pigmentation and handling qualities 2. width of back 3. depth of body 4. sexual maturity 5. femininity For production pullets, the main concern is body depth, width of breast and across the hips, and length of heel. Normally, sexual maturity is not taken into consideration unless: 1. two birds are equal; then place the more sexually developed bird up. 2. sexual development should not be used to place a bird over another that is superior in body depth but lacking in sexual maturity.	5
B. Did the contestant use the terms properly? Did the contestant understand the terms used? Was the contestant able to define the terms? (Contestant may be asked to define some comparative terms.)	5
TOTAL POINTS	10
3. ACCURACY OF STATEMENTS:	
A. Did the contestant really see the birds?	5
B. Were the contestants, true, partly true, or false?	5
TOTAL POINTS	10

4. IMPORTANCE OF POINTS COVERED:

A. Did the contestant acutally tell why one bird was placed over another or did the contestant just vaguely describe the birds? 5
B. Did the contestant stress the crucial differences or make stereotype comparisons of numerous factors? 8
C. Did the contestant tell all there was to tell of importance or were there several other good reasons that should have been given for placing? 5

TOTAL POINTS 18

GRAND TOTAL POINTS EACH SET OF REASONS 50

How to Give Reasons

A poultry judge must have reasons for placing one bird over another. It is not enough just to "like" one bird more than another. You must know and be able to tell others why and where the bird you "like" excels the other birds in the class. Try to develop a mental picture of each class you judge. The time allowed to judge a class is usually 10 minutes. In this time, you must make your observations, record your placings, and take any notes you want on the outstanding good and bad points of each bird. Later on, you are generally allowed 2 minutes to give your oral reasons.

When you are called on to give your reasons:

1. Stand squarely on both feet. Stand 8 to 10 feet in front of the official judge. Look at the judge while you talk.
2. Speak clearly, distinctly, and loud enough to be heard. Do not make long pauses. Have confidence in what you are saying.
3. Use a definite system in giving reasons. Begin by giving your contestant identification number and by telling how you placed the class. Next tell why you placed the top bird first, then your second and third, and last tell why you have placed the bottom bird last.
4. Make sure that you have covered the most important points such as pigmentation, handling quality, agdominal capacity, molt, body size, degree of feminity, etc. Also make sure that your statements are accurate.
5. Make sure your reasons are well organized so that they emphasize the big differences. Be fair and impartial. Use more comparative than descriptive terms.
6. Never try to memorize one set of reasons and attempt to apply it to all classes judged. Use correct terms and be able to define the terms used. Do not use cattle terms for poultry. Also try not to use such terms as good, better or best in describing the birds; instead tell how or why one bird is good or better than another.
7. Don't repeat and back-track. Say everything you have to say about each bird and go on to the next.
8. Don't hunt for things to say. If you make up some points, they are sure to be wrong. If you forget, just go on to the next bird.

The following form will be used in placing designated classes of dairy cattle, livestock, meats and poultry.

Form 2

STANDARD FFA PLACING CARD

____

Contest______________________________

Class Name______________________________

Class No.______________________________

Contestant Name______________________________

Contestant No.______________________________

Tabulator's Score____________________

Placings	Check Placing
1-2-3-4	
1-2-4-3	
1-3-2-4	
1-3-4-2	
1-4-2-3	
1-4-3-2	
2-1-3-4	
2-1-4-3	
2-3-1-4	
2-3-4-1	
2-4-1-3	
2-4-3-1	
3-1-2-4	
3-1-4-2	
3-2-1-4	
3-2-4-1	
3-4-1-2	
3-4-2-1	
4-1-2-3	
4-1-3-2	
4-2-1-3	
4-2-3-1	
4-3-1-2	
4-3-2-1	

Form 9

READY TO-COOK POULTRY

GRADING PERIOD

Class Name____________________ Class No.____________________

Contestant Name____________________ Contestant No.____________________

BIRD NUMBER	QUALITY			SCORE
	A	B	C	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
			TOTAL SCORE	

A deduction of 2 points will be made for each space that a bird is placed away from the correct quality with a maximum cut of 4 points per bird. Perfect score is 40 points.

EGG GRADING CARD **Form 10-A**

Individual Shell Eggs -- Interior Quality

Class Name____________________________ **Class No.**____________________

Contestant Name________________________ **Contestant No.**__________________

EGG NUMBER	QUALITY				SCORE
	AA	A	B	LOSS	
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
				TOTAL SCORE	

Deduct one point for each space the egg is placed away from the proper quality of edible egg. Deduct three points for crossing the loss line. Deduct a maximum of five points per egg. Interior quality only is to be considered. Perfect score is 100 points.

Form 10-B

EGG GRADING CARD

Individual Broken Out Eggs

Class Name________________________ Class No.__________

Contestant Name________________________ Contestant No.__________

EGG NUMBER	QUALITY A	QUALITY B	QUALITY C	LOSS	SCORE
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
			TOTAL SCORE		

Deduct one point for each space an egg is placed away from the proper quality. of edible egg. Deduct three points for crossing the loss line. Deduct a maximum of five points per egg. Interior quality only is to be considered. Perfect score is 100 points.

EGG GRADING CARD

Form 10-C

Individual Shell Eggs -- Exterior Quality

Class Name____________________ Class No.________________

Contestant Name____________________ Contestant No.________________

	QUALITY				
EGG NUMBER	A	B	C	DIRTY	SCORE
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					
				TOTAL SCORE	

Twenty eggs. Deduct one point for each space an egg is placed away from the proper perfect quality. Deduct a maximum of three points for crossing the dirty line and deduct a maximum of five points per egg. Perfect score is 100 total points. The eggs in this class will not be handled and each decision will be made on the visible portion of the shell. Exterior quality only is to be considered. Students should ignore cracks in eggs.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 7: Selecting and Judging Sheep

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify and describe the criteria used in selecting an individual or group of sheep or lambs depending on the use for which the animal or animals are intended.

2. Specific:

a. Define new terms.
b. List four purposes for which sheep are selected.
c. Explain selection based on conformation.
d. Describe selection based on production records.
e. Discuss selection based on pedigree.
f. Outline a procedure for judging sheep.
g. Determine animal's age by teeth.
h.

i.

j.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E. The Stockman's Handbook. 5th. Edition, Danville: Interstate Publishers, 1978.

3. Animal Science I, LSU Cooperative Extension Service, Publication 1440.

4. Livestock Judging Bulletin, State Department of Education, No. 1546. of Education, No. 1546.

C. Special Arrangements

1. Materials

   a. Charts showing parts of sheep.
   b. Charts showing wholesale cuts.
   c. Charts showing how to select sheep based on teeth (age).

2. Travel -- field trip to livestock show to judge classes of sheep.

3. Audio-visual equipment -- films and transparencies on judging sheep.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Present items representing the four purposes for which sheep are selected (type, pedigree, showing and production testing).

2. List the values of lamb as food.

   a. Easy to digest.
   b. Quick energy.
   c. High in vitamins and minerals.

3. Discuss the value of wool as a fiber.

   a. Each strand has tiny scales (prepare a wool strand for microscopic observation).
   b. Retains shape.
   c. Is lightweight.
   d. Traps and holds air.

4. Demonstrate the practicality of wool.

   a. Resists fire.
   b. Resists sun fading and soiling.
   c. Sheds water.
   d. Soaks up dyes.

B. Content Outline

1. Terms

    a. Mutton -- A sheep or goat over one year of age that was castrated while young; also female sheep and goats over one year.

    b. Constitution -- A judging term used to describe structure or physical makeup of the animal.

    c. Substance of bone -- A judging term used to describe the form or structure of the bone or skeletal framework.

    d. Braid -- Coarsest grade of wool.

    e. Crimp -- The characteristic form or succession of waves in wool fibers; a desirable crimp is close and distinct.

2. Purposes for selecting sheep

    a. Breeding sheep, with mutton production as primary objective; attention given to producing heavy-weaning lambs of acceptable grade type and age. (Transparency II-7-C)

    b. Breeding sheep, with wool production as the primary objective; clean weight and quality of fleece are of primary importance.

    c. Feeder lambs for the feedlot; based on desirable type and quality, health and vigor, and predicted performance in the feedlot.

    d. Slaughter lambs for market (including show lambs); selected for the market using conformation, finish, age and estimated quality and yield of carcass as the criteria in determining value. (Transparencies II-7-C&A)

3. Selection based on conformation (two products, wool and meat, of economic importance are involved)

    a. Body conformation -- Must have an ideal or standard in mind. Ideal means plenty of size and growthiness; heavy muscling -- especially in the leg and loin; a long body; trimness and freedom from waste; straight, widely set legs; a fleece of acceptable weight and quality; and a pink skin. Rams should show boldness and masculinity, and ewes should be feminine. (Transparency II-7-A

b. Wool -- Emphasis varies with the type of sheep being selected. Fibers should be long, fine, of good crimp; the fleece should be dense, clean, and bright. Animals with fleeces that show black fibers or any tendency of the fleece to be hairy, loose, or open should be rejected. The major factors considered in the evaluation and classification of wool are as follows:

1) Fineness -- diameter of the fiber.

2) Staple length -- contributes to the quantity of wool and the loftiness of fleece volume.

3) Density -- the number of fibers grown in a given area of skin.

4) Clean wool yield -- the percentage of clean wool remaining after all foreign material has been removed by washing and scouring.

4. Selection based on production records.

The importance attached to each trait will vary in different areas. Where wool production is important, greater stress should be placed upon selecting animals whose progeny possess the maximum in fleece weight and quality.

Where feed is more abundant and the animal income is derived from the sale of lamb, evaluations should be based largely on the market weight, type, and finish of the offspring.

It is production -- of which individuality or type is merely a part-that produces the income.

Selection based on either performance testing or progeny testing is far more accurate than any other method of selection.

5. Selection based on pedigree.

   Not as much importance is placed on the pedigree as a basis of selection of sheep as there is in other classes of livestock. Sheep breed associations use numbers to designate the registered animal. An outstanding ancestor in the pedigree would be a factor for consideration.

6. Procedure for examining sheep.

   Should be systematic and thorough. Sheep should first be looked over from a distance. The impression gained through distant inspection should be verified by handling with the hands. (Nine steps for contact handling Transparency II-7-B)

7. Factors determing market classes.

   The disposition or use to be made of sheep is determined by (1) whether they are sheep or lambs, (2) the use selection, (3) sex, (4) age, and (5) weight. (Transparency II-7-C)

C. Suggested Student Activities

1. Prepare a display exhibit showing products of wool and their qualities.
2. Prepare a list of the industries using products of sheep.
3. Trace the history of contributions from sheep to man's existence.
4. Discuss the improvement of sheep in meeting today's standards.
5. Judge a class of lambs (live animals or pictures).

D. Suggested Study Questions

1. Define all terms in lesson.
2. What are the purposes of selecting sheep?
3. Describe ideal body conformation of sheep.
4. What are the different qualities considered in the production of wool?
5. Discuss selection based on production and pedigree.
6. Describe the proper procedure for selecting sheep.
7.
8.

INFORMATION SHEET
MARKET LAMB JUDGING

General Appearance

Mutton type. Muscular throughout, long or medium height
Size for age. Large, early-maturing
Symmetry. Straight top and bottom lines, trim underline; trim in breast and flanks, stylish

Conformation

Head -- not too large or too small for size of body; face short; forehead broad, wide between the ears
Neck -- medium long or average; smoothly joined shoulders, thick
Brisket -- trim, free of excess finish
Shoulders -- shoulder vein medium full, not open or rough, smooth, muscular
Breast -- wide, deep, trim, neat, clean
Back -- straight, long, muscular, strong, uniformly covered with desirable amount of finish
Loin -- level, thick, long, muscular, uniformly covered with minimum fleshing
Ribs -- well sprung, long, close together
Flank -- trim, neat, free of excess finish
Hips -- smooth, not prominent
Rump -- long, wide to dock, level, smooth, thick, muscular
Thighs -- deep, wide, plump
Twist -- medium deep, not cut up, free of excess finish
Legs -- straight, strong, average length, adequate bone

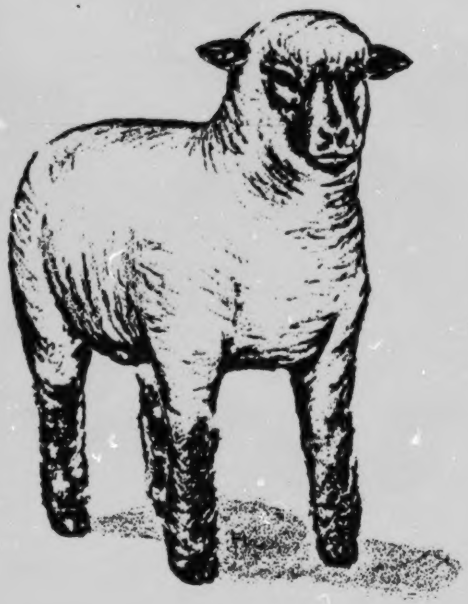
Finish

Brisket -- trim, neat, free of excess finish, full between shoulder and brisket
Shoulder vein -- full
Shoulders, back, loin, ribs, and rump -- covered with minimum finish, firm finish
Flank -- neat and trim, free of excess finish
Dock -- large, thick
Leg of mutton -- thick, plump, muscular
Twist -- medium depth, not overly finished

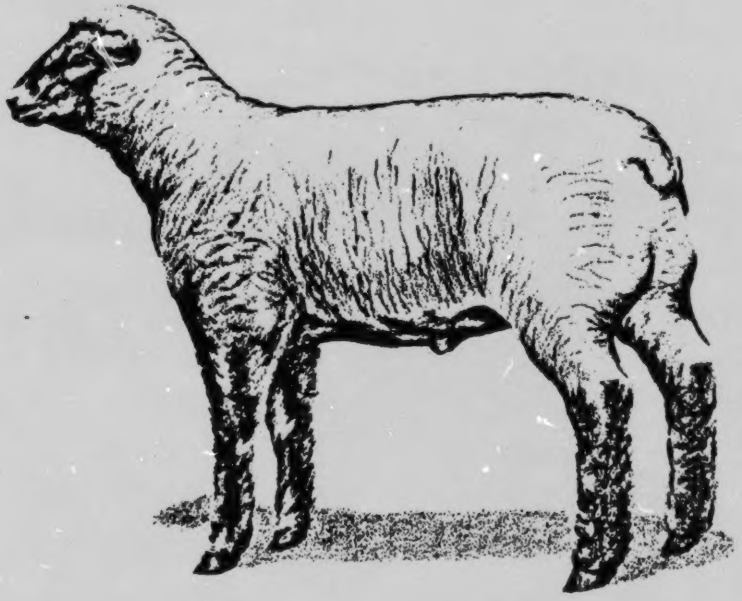
Quality

Bone medium in size; features and head clean-cut, refined but not delicate; ears not coarse; shoulder not prominent
Flesh smooth, firm, and not excessive

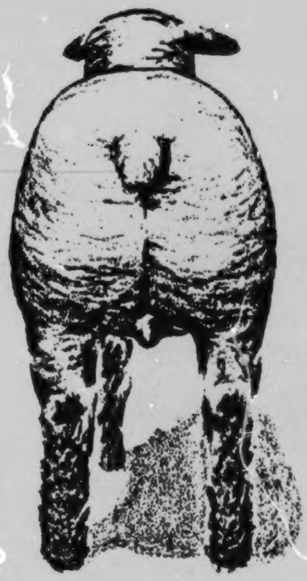
IDEAL CONFORMATION



FRONT VIEW



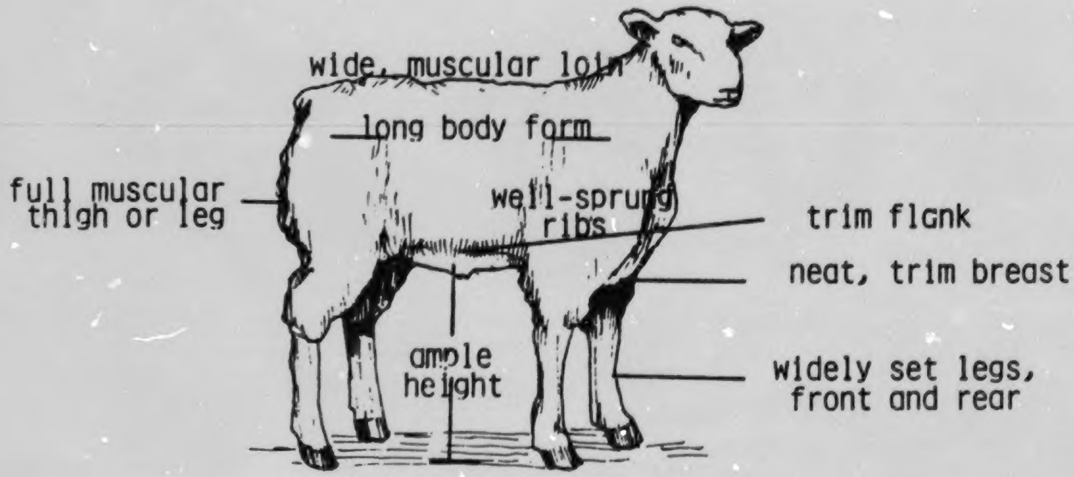
SIDE VIEW



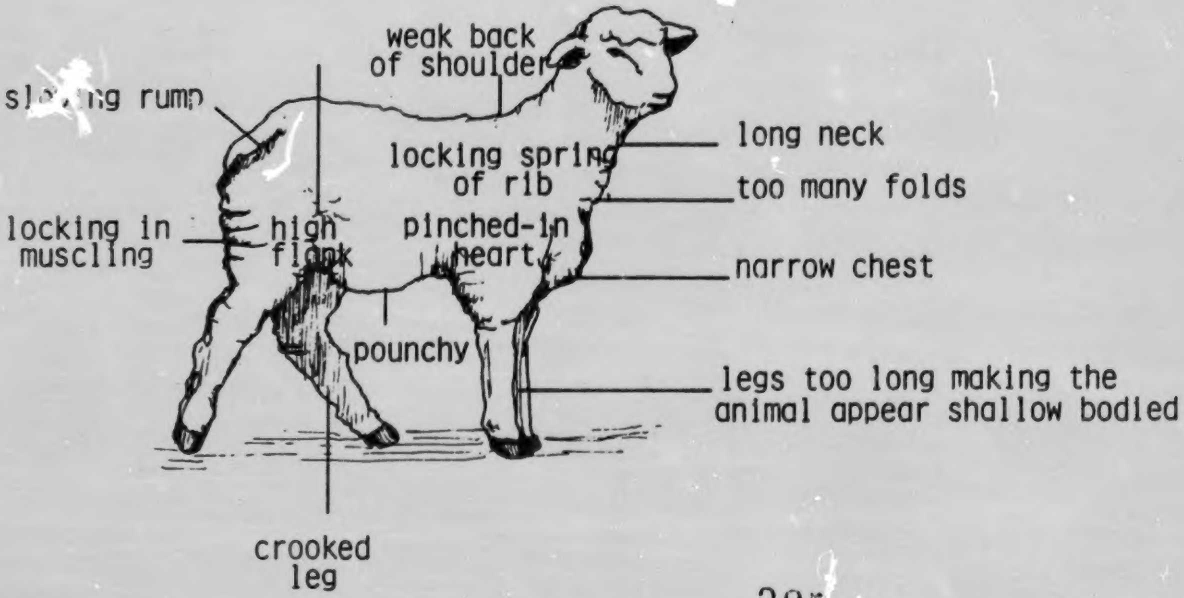
REAR VIEW

Transparency II-7-A

IDEAL MEAT TYPE CONFORMATION


wide, muscular loin
long body form
full muscular thigh or leg
well-sprung ribs
trim flank
neat, trim breast
ample height
widely set legs, front and rear

SOME COMMON FAULTS IN CONFORMATION


weak back of shoulder
sloping rump
long neck
locking spring of rib
too many folds
locking in muscling
high flank
pinched-in heart
narrow chest
pounchy
legs too long making the animal appear shallow bodied
crooked leg

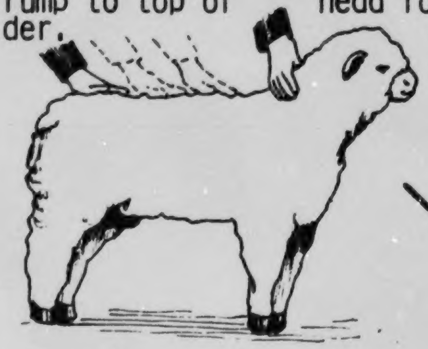
Transparency II-7-B_1

SELECTING AND JUDGING SHEEP

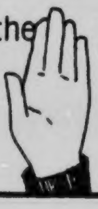
PROCEDURE FOR EXAMINING SHEEP

Examine strength of top and covering from rump to top of shoulder.

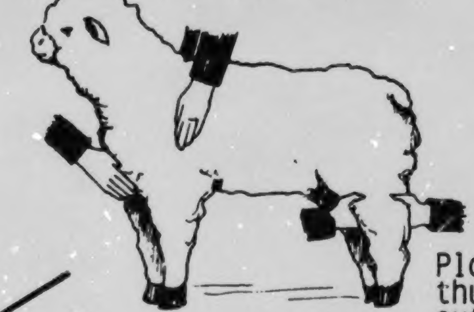
Feel neck for fullness and check head for scurs.



Join and extend the fingers. Do not jab the animal. Feel with the pads of the fingers.



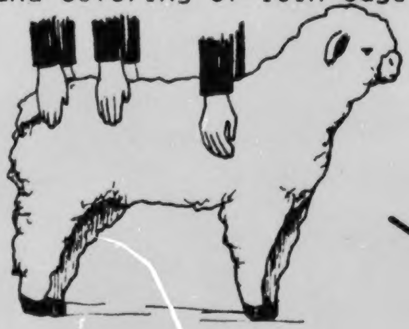
Check width and covering over the point of the shoulders.



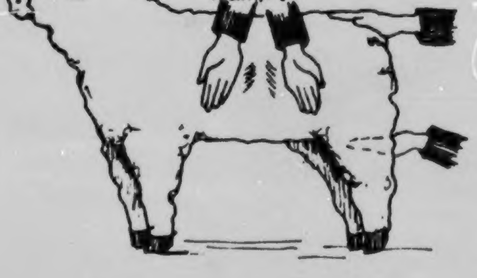
Examine firmness of brisket. Determine depth of heart girth.

Place the thumbs on the outside of the leg and the fingers on the inside to feel muscling down to hock.

Check width of rump, spring of rib and covering, and width and covering of loin edge.



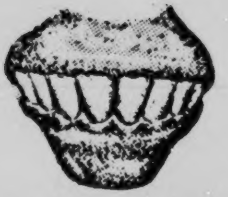
To measure depth of twist, place one hand in the middle of the thighs and the other on top of the rump.



Part fleece with the back of the hand with palms open. This reflects light onto the fleece. Check this on shoulder, side, and thigh.

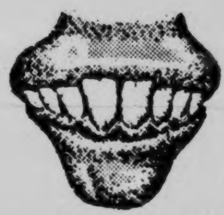
Transparency II-7-B_2

TEETH OF SHEEP OF DIFFERENT AGES



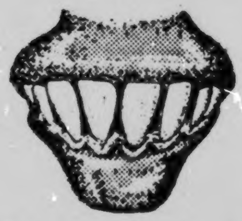
LAMB MOUTH

8 temporary incisors



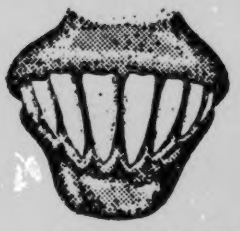
YEARLING MOUTH

2 permanent middle incisors



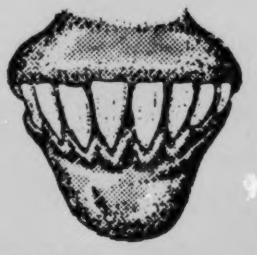
2—YEAR—OLD MOUTH

4 permanent incisors



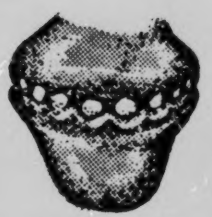
3—YEAR—OLD MOUTH

6 permanent incisors



4—YEAR—OLD MOUTH

all permanent incisors



OLD SHEEP MOUTH

teeth well worn

Transparency II-7-C

Information Sheet II-7-A

LIVESTOCK JUDGING CONTEST

Purpose: Livestock judging involves beef cattle, swine, and sheep. The ability to judge livestock is one of the most essential and constantly used talents of the livestock person. The practical person must be a good feeder, a devoted caretaker, a skillful breeder and must know how to buy and sell to the best advantage. The ability to judge is the basis of success in all of these phases of livestock production. Even though considerable emphasis is placed on competitive judging and judging contests, this is not the most important purpose for learning to judge livestock. The development of livestock judging teams and judging contests aids in training young men and women to be able to select and improve breeds of livestock.

Rules and regulations:

1. Using form 2 (or computer card)

    A. At least four of the following classes of animals will be placed: breeding cattle, market cattle, breeding sheep, market sheep or lambs, market swine and breeding swine.
    B. Contestants will have 12 minutes to place each class.
    C. At lease one class from A. above will be designated as an oral reason class before the judging begins and participants will be notified.

2. Oral Reasons:

    A. Contestants will have 12 minutes to place the class and 5 extra minutes to prepare reasons.
    B. A maximum of 2 minutes will be allowed to give reasons.
    C. Contestants may use the placing card in delivering reasons; no other notes will be permitted.
    D. Reasons will be scored on the basis of 50 points for a perfect score.
    E. The State Staff and University personnel will determine the cut-off point as to which teams will be required to deliver oral reasons at all area contests.
    F. All sixteen teams will be required to deliver oral reasons at the State Contest.

3. Using Form 12:

    A. A maximum of one class of market swine consisting of no more than 10 head may be graded individually according to the latest US market grades.
    B. All grades will not necessarily be represented.
    C. For most current information, copies of standards and posters (large and small) illustrating these grades, write to Livestock-Poultry-Grain and Seed Division, Agricultural Marketing Service, USDA, Washington, D.C. 20250. Extension Folder 436, Pork Carcass and Slaughter Swine Grading, Agricultural Extension Service, University of Minnesota, St. Paul, MN 55108.

Information Sheet II-7-B

STANDARD FFA PLACING CARD

Form 2

Contest____________________________________

Class Name_________________________________

Class No.__________________________________

Contestant Name____________________________

Contestant No._____________________________

Tabulator's Score__________________________

PLACINGS	CHECK PLACING
1-2-3-4	
1-2-4-3	
1-3-2-4	
1-3-4-2	
1-4-2-3	
1-4-3-2	
2-1-3-4	
2-1-4-3	
2-3-1-4	
2-3-4-1	
2-4-1-3	
2-4-3-1	
3-1-2-4	
3-1-4-2	
3-2-1-4	
3-2-4-1	
3-4-1-2	
3-4-2-1	
4-1-2-3	
4-1-3-2	
4-2-1-3	
4-2-3-1	
4-3-1-2	
4-3-2-1	

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 8: Selecting and Judging Horses

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Describe the ideal horse, regardless of type or breed.

2. Specific:

   a. Define new terms.
   b. List factors of correct form.
   c. Describe correct legs, feet, and pasterns.
   d. Define action.
   e. Name common conformation defects affecting soundness.
   f. Identify other means of selection.
      1) Pedigree
      2) Performance
      3) Disposition and intelligence.
   g.

   h.

   i.

B. Review Teaching Material

1. Bundy, Clarence E., Ronald V. Diggins, and Virgil W. Christensen. Livestock and Poultry Production. 4th. Edition, Englewood Cliffs, New Jersey: Prentice-Hall, 1975.

2. Ensminger, M.E. Animal Science. 7th Edition, Danville: Interstate Publishers, 1977.

3. Animal Science I, LSU Cooperative Extension Service, Publication 1440.

C. Special Arrangements

1. Slides, pictures, and transparencies showing parts of the horse.

2. Field trip to parish fair or a farm.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

1. Discuss the difficulty of judging horses because of the additional criterion of action and frequency of unsoundness.

2. Discuss the use of horses in local area in these categories:
   a. draft horses and mules
   b. light horses and ponies

3. Discuss the purposes for which horses are produced as compared with other classes of livestock. (Transparency II-8-A)

B. Content Outline

1. Terms

   a. Gait -- A particular natural or acquired way of going, characterized by a distinctive movement of feet and legs.

   b. Unsoundness -- An abnormal deviation in the structure or function of a horse that affects serviceability.

   c. Blemishes -- Abnormalities that do not affect serviceability.

   d. Breed type -- Distinctive characteristics of a breed, including conformation, color, height, and weight.

   e. Splints -- Abnormal bony growth found on the cannon bone of some horses.

   f. Pounding -- Heavy contact with the ground, instead of desired light, springy movement.

   g. Balance -- The skeletal and muscular make-up of a horse which determines his overall weight distribution and maneuverability.

   h. Quality -- Evaluated as clean, flat bone; well defined, clean joints and tendons; and fine skin and hair.

   i. Cut-up -- A high flanked animal usually slight in body capacity.

   j. "V" Muscle -- The muscles of the chest of a horse which give the appearance of an inverted "V" between the two front legs.

   k. Forging -- Striking forefoot with the toe of the hindfoot.

   l. Broodmare -- A female horse used for breeding purposes.

   m. Filly -- A young female under 5 years of age.

   n. Mare -- A mature female horse 5 years or more of age.

o. Colt -- A young male horse up to 5 years of age.

p. Stallion -- A mature male horse 5 or more years of age.

q. Gelding -- A desexed male horse.

r. Foal -- A young horse of either sex up to one year.

s. Colors

1) Appaloosa
2) Bay
3) Black
4) Brown
5) Buckskin
6) Chestnut
7) Dun
8) Gray
9) Roan
10) Palomino
11) Sorrel - light red

Refer to Livestock and Poultry Production Book, Pages 357-358.

2. Desirable characteristics

a. Correct form

1) Good head, neck, and shoulders.
2) Strong, heavily-muscled topline, short back and loin; long, level croup.
3) Ample chest and middle.
4) Well muscled arm, forearm, and gaskin. (Transparency II-8-A&F)

b. Correct legs, feet, and pasterns

1) Legs -- straight, true, and squarely set.
2) Bone -- well placed and clearly defined.
3) Pasterns -- sloping and of medium length.
4) Feet -- large and wide at the heels.
5) Hock -- large, clean, wide from front to back; deep, clean cut and correctly set.
6) Knee -- deep from front to rear; wide when viewed from the front, straight and tapers gradually into the leg. (Transparencies II-8-D&E)

c. Good action

Although the degree of action will vary somewhat with the type (draft, speed, show, and saddle), the usefulness of all horses is dependent on their action and their ability to move. The motion should be straight and true with a long, swift, and elastic stride in various types of activities.

Gait, in saddle and harness horses, has to do with the distinctive rhythmic movement of the feet and legs as the horse moves. Action or way of going are also terms which apply to the gait of a horse.

d. Soundness

The beginner should exercise caution in selecting a horse. It is a good idea to get assistance in order to avoid an animal which has blemishes or is unsound. Any condition that affects the working ability or action should be analyzed very carefully. (Transparencies II-8-B,C,D&E)

e. Selection based on disposition, intelligence, and ancestry

1) The disposition of a horse determines the safety and enjoyment of the handler. Certain qualities of disposition are inherited, whereas others are acquired.
2) Intelligence--difficult attribute to measure.
3) Intelligence and disposition will influence performance.
4) Intelligence and disposition are not synonymous.
5) Eyes and ears are good indicators of intelligence and disposition.
6) Disposition influenced and developed through handling and environment.

f. Pedigree as a basis for selection--the bloodline is of more importance in the selection of horses than the selection of other livestock species.

101 g. Selection on the basis of sex and age

The sex of an animal will have a direct effect upon its performance. Mares and stallions have proven to be less predictable than geldings in performance. There are exceptions, however, and the predictability of the performance of mares and stallions usually increases with age. Also, mares and stallions are necessary in a breeding operation, and those which exhibit outstanding ability in performance may be very valuable in the stud or as a broodmare.

Though geldings are preferred by most, for stock horse performance purposes because of their high level of predictability, they have little value should they become crippled or unable to perform. Most trainers will agree that geldings will maintain a high level of performance longer than mares or stallions, as well as being more easily managed.

The age at which a horse is trained and the level of use will usually determine his length of usefulness. The bones of a horse mature around 30 months of age, depending on his level of nutrition. Most horses which are trained after they have physically matured will remain sound until they are well past 12 years of age under normal use. A high incidence of breakdown, especially in the legs, is noted among two-year-olds that are raced extensively.

h. Price

A high price does not always indicate the real value and usefulness of a horse. By the same token a low price does not reflect an inferior animal. It is often wise to buy when there are the fewest buyers. This usually means buying in the fall or winter rather than in the spring and summer. A buyer should consider strongly investing in a horse that will fill the needs and provide the satisfaction required.

i. Vices

Horses may develop a number of vices (bad habits or tricks) which lower their value or usefulness. Some of these vices could be dangerous to the horse or owner. It is often difficult to break older animals of these bad habits. Most owners prefer to purchase young animals and train them themselves to avoid these vices.

j. Colors and Markings

Within certain breeds, some colors are preferred or required, and others are undesirable or constitute disqualifications for registration. A good horseman needs a working knowledge of horse colors and patterns because they are the most conspicuous features by which a horse can be described or identified.

k. Performance as a basis for selection

Breed associations maintain records on individuals on the basis of performance in sanctioned association competition.

l. Other points to consider in selection

Individual preference in breed or color is important in selection. Although animals of several breeds may be comparable with the exception of breed or color, an individual will never be as satisfied with a horse of a breed other than his preferred breed.

In selecting breeding stock, it is important to to assess breeding ability as well as conformation. Sterility in stallions and barrenness in mares make them worthless as breeding stock regardless of their worth as performance or halter horses. Timid and slow breeders are also a problem; however, these problems can sometimes be eliminated. It is important for a veterinarian to check breeding stock if they are not well known by the individual.

There are numerous defects which appear in conformation of horses. Some are more serious than others, and again the purpose for which the animal is selected has a bearing on the seriousness of the defects. It has been said many times that a horse is only as good as his feet and legs.

C. Suggested Student Activities

1. Attend a breed sanctioned horse show.
2. Write breed associations of popular local breeds for performance information.
3. Prepare an exhibit showing the ideal conformation and common conformation defects.
4. Visit a farm which has horses.

D. Suggested Study Questions

1. Define the terms that relate to this lesson.
2. What are the major factors considered in judging correct form?
3. What are the major factors to consider in judging legs, feet, and pasterns?
4. Describe selection based on action of a horse.
5. Explain selection based on disposition, intelligence, and ancestry of a horse.
6. Describe pedigree as a basis for selection.
7. List the major parts of a horse and how to evaluate each for proper qualities.
8. Name the six major divisions of the horse judging scorecard and be able to discuss the subdivisions of each.

INFORMATION SHEET
SCORE CARD FOR THE LIGHT SADDLE HORSE

Scale of Points	Standard or Perfect Score
General Appearance -- 12 percent	
Height	
Weight	
Form (Close but not full made, deep but not broad, symmetrical)	4
Quality (Bone clean, dense, fine, yet indicating substance. Tendons and joints sharply defined, hide and hair fine; general refinement, finish)	4
Temperament (Active, disposition good, intelligent)	4
Head and Neck -- 8 percent	
Head (Size and dimensions in proportion, clear-cut features, straight face line, wide angle in lower jaw)	1
Muzzle (Fine, nostrils large, lips thin, trim, even)	1
Eyes (Prominent orbit; large, full, bright, clear; lid thin, even curvature)	1
Forehead (Broad, full)	1
Ears (Medium-size, pointed, set close, carried alert)	1
Neck (Long, supple, well crested, not carried too high, throttle well cut out, head well set on)	3
Forehand -- 22 percent	
Shoulders (Very long, sloping, yet muscular)	3
Arms (Short, muscular, carried well forward)	1
Forearm (Long, broad, muscular)	1
Knees (Straight, wide, deep, strongly supported)	2
Cannons (Short, broad, flat, tendons sharply defined, set well back)	2
Fetlocks (Wide, tendons well back, straight, well supported)	2
Pasterns (Long, oblique - 45 degrees - smooth, strong)	2
Feet (Large, round, uniform, straight slope of wall parallel to slope of pastern, sole concave, bars strong, frog large, elastic heels wide, full, one-third height of toe, horn dense, smooth, dark color)	5

SCORE CARD FOR THE LIGHT SADDLE HORSE

Scale of Points	Standard or Perfect Score
Legs (Direction: viewed from in front, a perpendicular line dropped from the point of the shoulder should divide the leg and foot into two lateral halves; viewed from the side, a perpendicular line dropped from the tuberosity of the scapula should pass through the center of the elbow-joint and meet the ground at the center of the foot)	4
Body -- 12 percent	
Withers (High, muscular, well finished at top, extending into back)	3
Chest (Medium-wide, deep)	2
Ribs (Well sprung, long, close)	2
Back (Short, straight, strong, broad)	2
Loin (Short, broad, muscular, strongly coupled)	2
Flank (Deep, full, long, low underline)	1
Hindquarters -- 31 percent	
Hips (Broad, round, smooth)	2
Croup (Long, level, round, smooth)	2
Tail (Set high, well carried)	2
Thighs (Full, muscular)	2
Stifles (Broad, full, muscular)	2
Gaskins (Broad, muscular)	2
Hocks (Straight, wide, point prominent, deep, clean cut, smooth, well supported)	5
Cannons (Short, broad, flat, tendons sharply defined, set well back)	2
Fetlocks (Wide, tendons well back, straight, well supported)	2
Pasterns (Long, oblique -- 50 degrees -- smooth, strong)	2
Feet (Large, round - slightly less than in front - uniform, straight, slope of wall parallel to slope of pastern, sole concave, bars strong, frog large and elastic, heels wide, full, one-third height of toe, horn dense, smooth, dark color)	4
Legs (Direction: viewed from the rear, a perpendicular line dropped from the point of the buttock should divide the leg and foot into lateral halves; viewed from the side this same line should touch the point of	4

SCORE CARD FOR THE LIGHT SADDLE HORSE

Scale of Points	Standard or Perfect Score
the hock and meet the ground some little distance back of the heel; a perpendicular line dropped from the hipjoint should meet the ground near the center of the foot)	
Way of Going (Action) 15 percent	
Walk (Rapid, flat footed, in line)	5
Trot (Free, straight, smooth, springy, going well off hocks, not extreme knee fold)	5
Canter (Slow, collected, either lead, no cross canter)	5
Total	100

2

CLASSIFICATION OF HORSES ACCORDING TO TYPE AND USE

A. Riding Horses:

1. SADDLE (THREE GAITED, FIVE GAITED)
2. WALKING
3. STOCK
4. POLO
5. HUNTERS AND JUMPERS
6. PONIES

B. Race Horses:

1. RUNNING (THOROUGHBRED, QUARTER ETC.)
2. HARNESS (TROTTERS AND PACERS)

C. Driving horses:

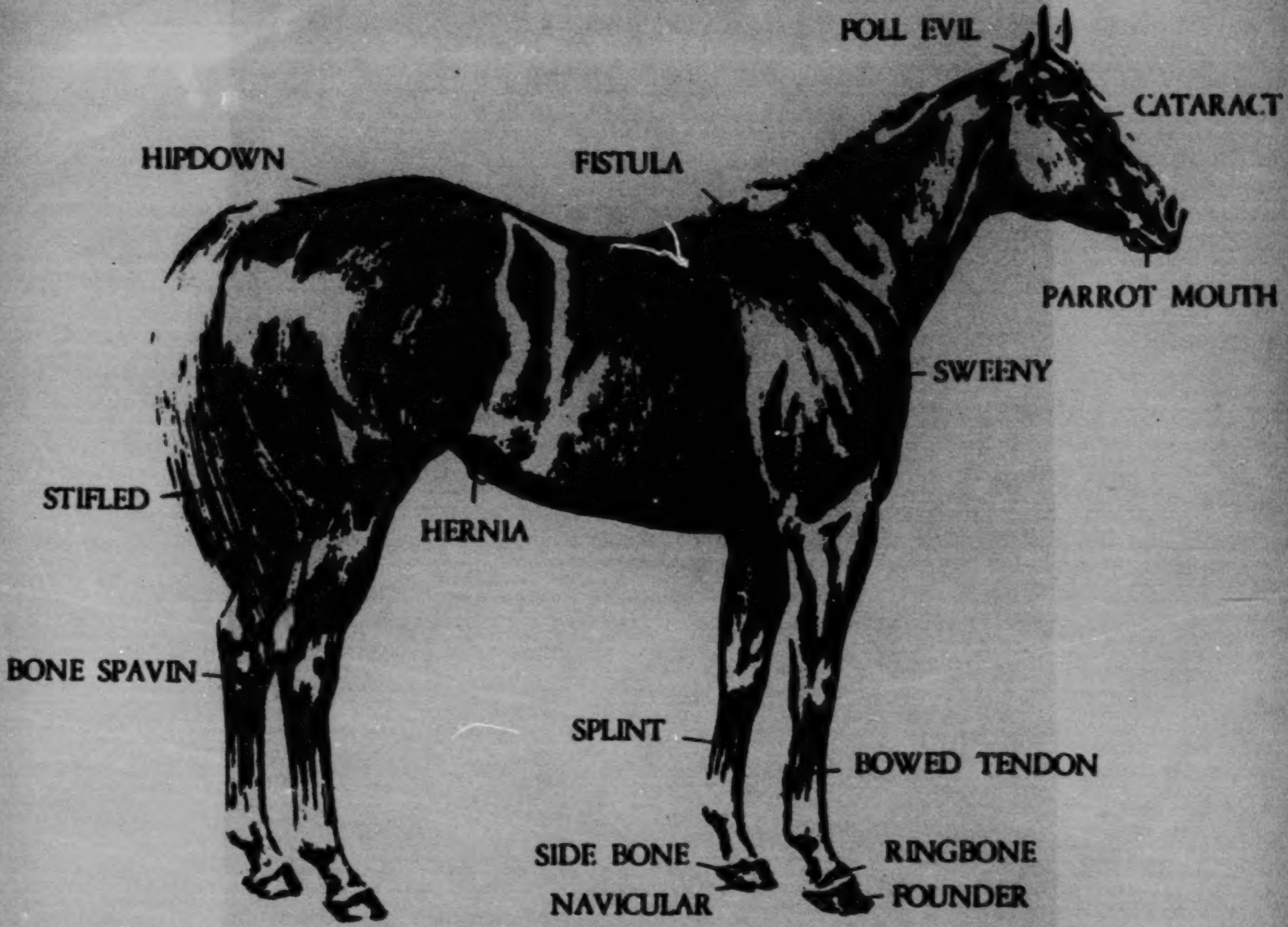
1. HEAVY HARNESS
2. FINE HARNESS
3. ROADSTERS
4. PONIES (HEAVY AND LIGHT HARNESS)

D. Work horses:

1. DRAFT
2. WAGON
3. EXHIBITION

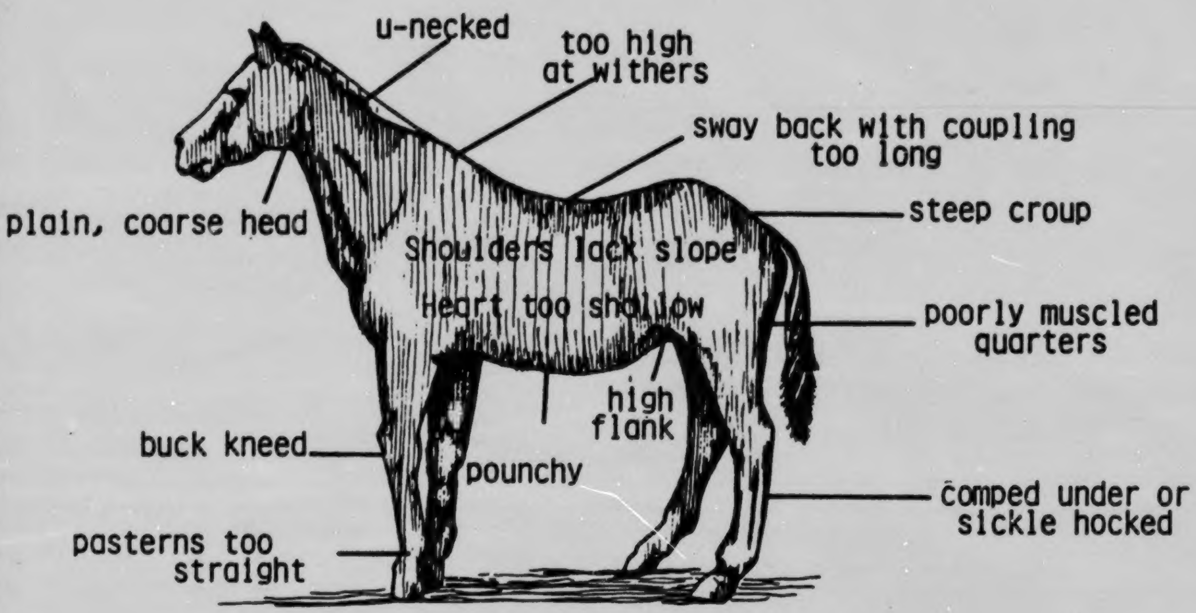
Transparency II-8-A

COMMON AILMENTS AND LAMENESSES of the horse

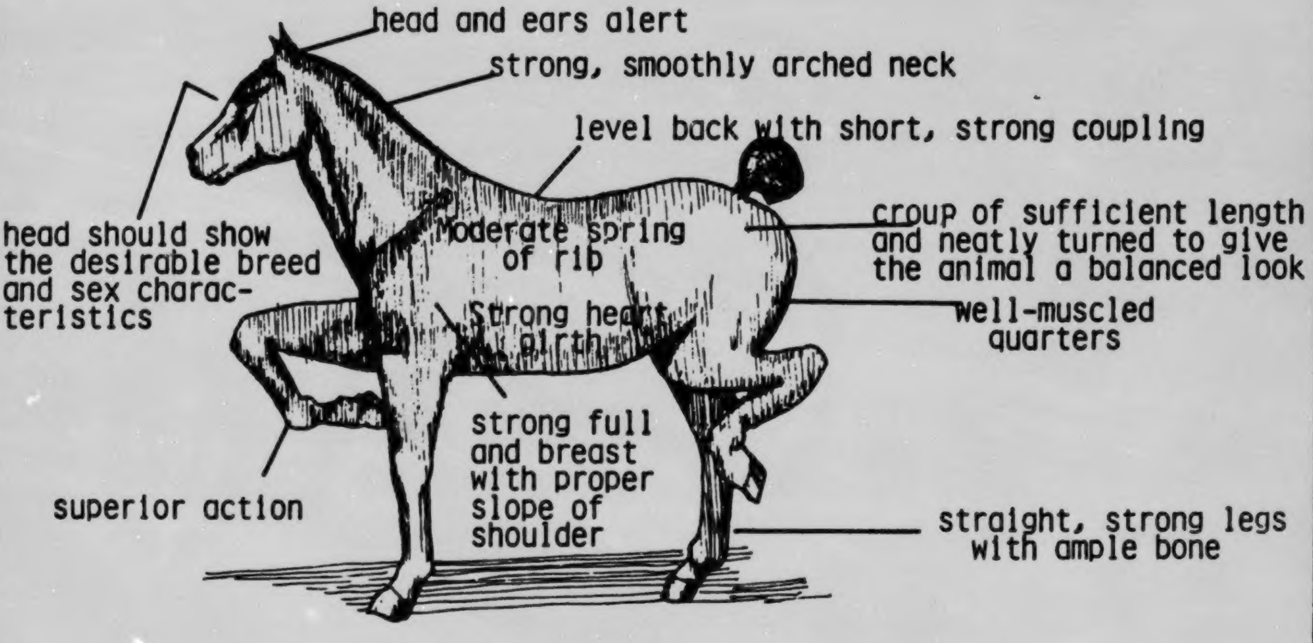

POLL EVIL
CATARACT
HIPDOWN
FISTULA
PARROT MOUTH
SWEENY
STIFLED
HERNIA
BONE SPAVIN
SPLINT
BOWED TENDON
SIDE BONE
RINGBONE
NAVICULAR
FOUNDER

Transparency II-8-B

SOME CONFORMATION FAULTS OF THE HORSE

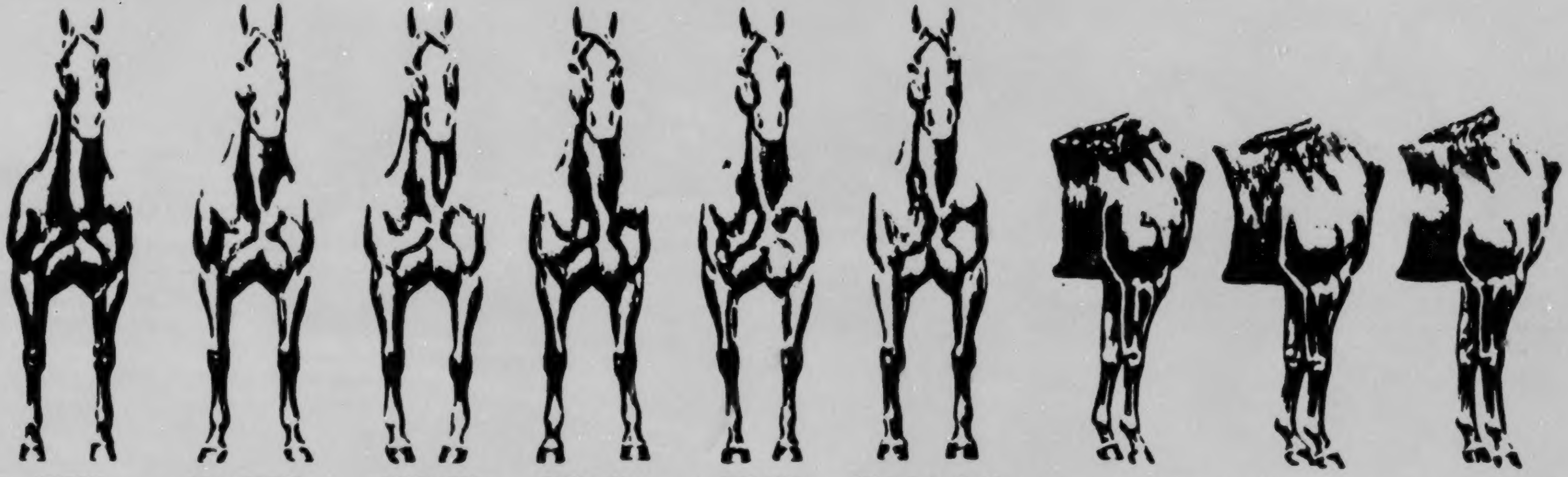

u-necked
too high at withers
sway back with coupling too long
plain, coarse head
steep croup
Shoulders lack slope
Heart too shallow
poorly muscled quarters
high flank
buck kneed
pounchy
comped under or sickle hocked
pasterns too straight

SOME DESIRABLE CONFORMATION FEATURES OF THE HORSE


head and ears alert
strong, smoothly arched neck
level back with short, strong coupling
head should show the desirable breed and sex characteristics
Moderate spring of rib
croup of sufficient length and neatly turned to give the animal a balanced look
Strong heart girth
well-muscled quarters
strong full and breast with proper slope of shoulder
superior action
straight, strong legs with ample bone

Transparency II-8-C

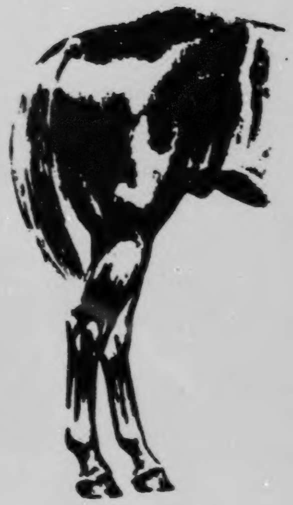
COMMON CONFORMATION DEFECTS (front legs)

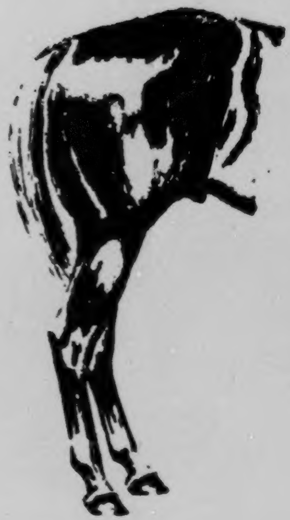


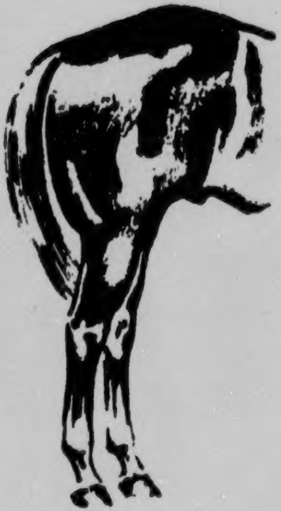
CORRECT SPLAY FOOTED PIGEON TOED BASE WIDE BASE NAROW OFF IN THE JOINTS CORRECT BUCK KNEED AND COON FOOTED CALF KNEED AND STRAIGHT PASTERNS

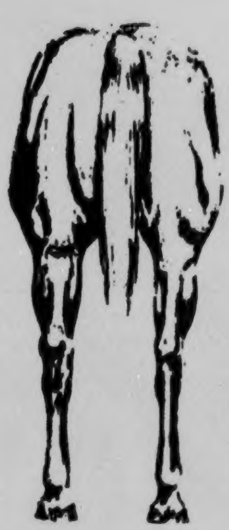
Transparency II-8-D

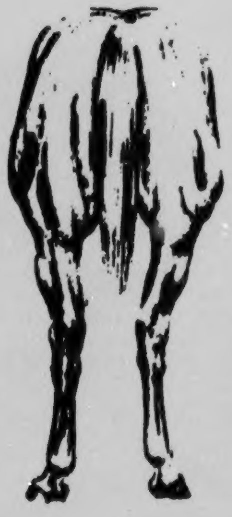
COMMON CONFORMATION DEFECTS (hind legs)

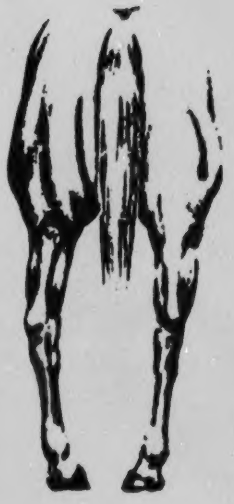

CORRECT


SICKLE HOCKED


POST LEGGED

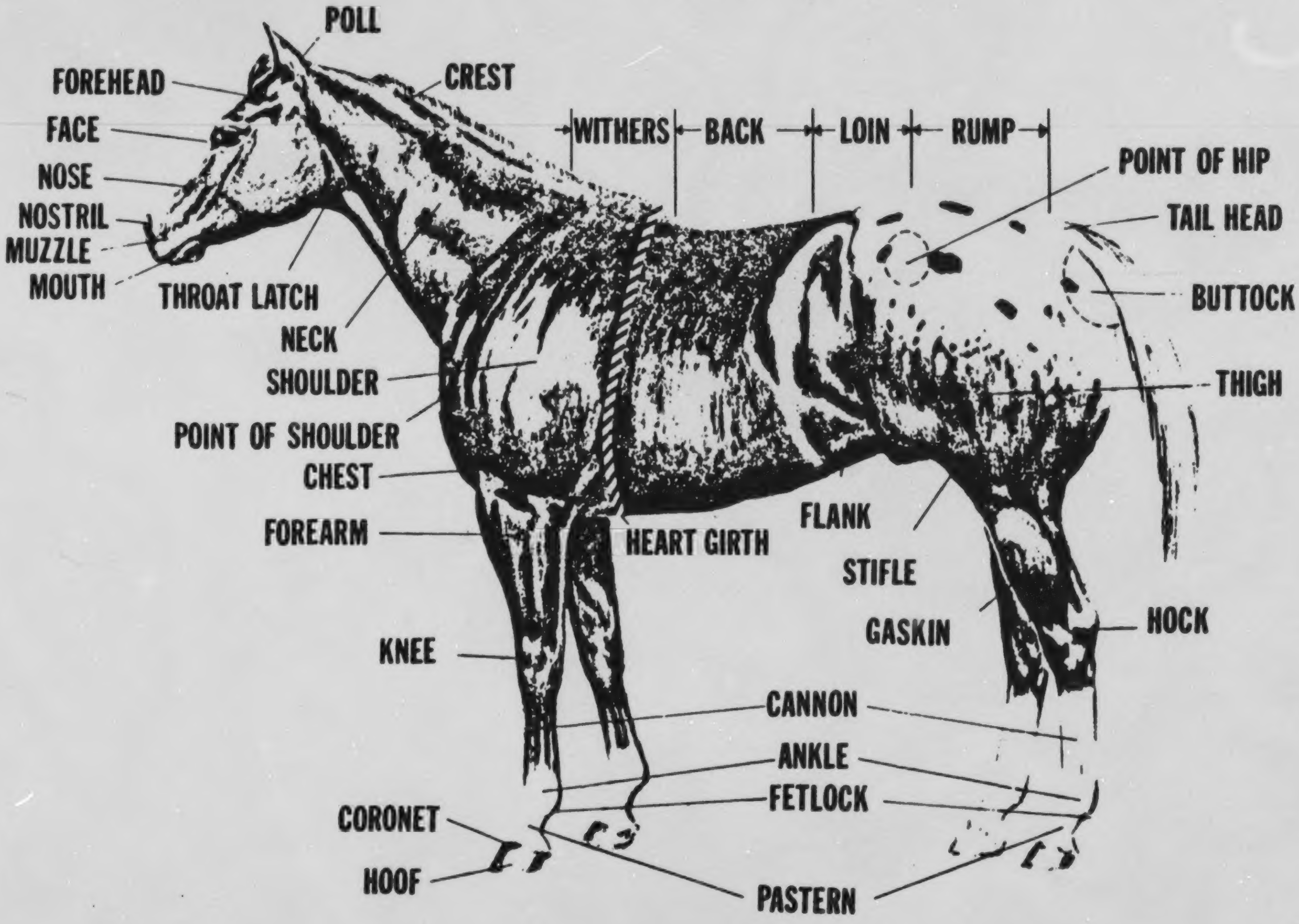

CORRECT


COW HOCKED

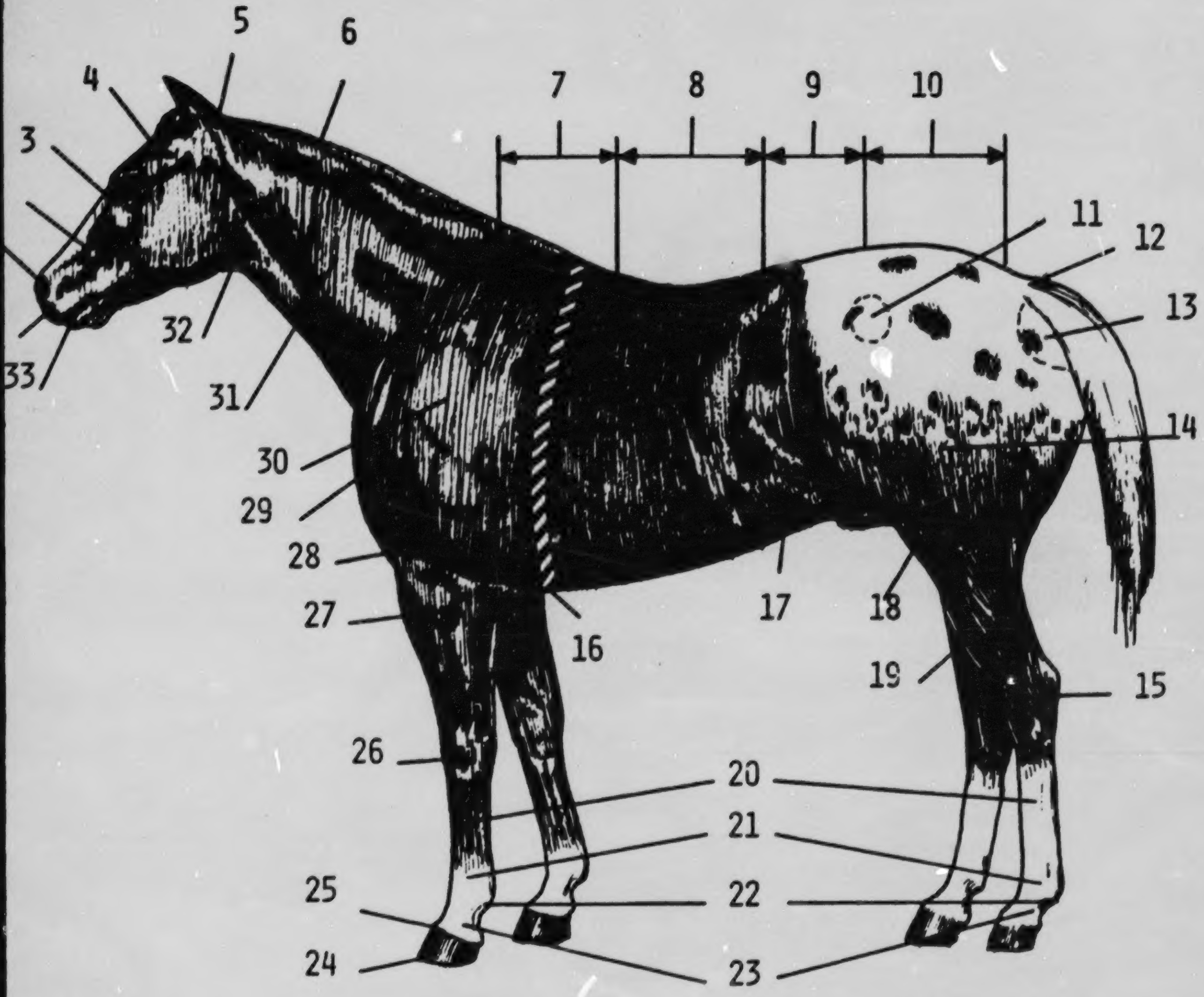

BANDY LEGGED

Transparency II-8-E

PARTS OF THE HORSE


POLL
FOREHEAD
CREST
FACE
WITHERS
BACK
LOIN
RUMP
POINT OF HIP
NOSE
NOSTRIL
TAIL HEAD
MUZZLE
MOUTH
THROAT LATCH
BUTTOCK
NECK
SHOULDER
THIGH
POINT OF SHOULDER
CHEST
FLANK
FOREARM
HEART GIRTH
STIFLE
GASKIN
HOCK
KNEE
CANNON
ANKLE
FETLOCK
CORONET
HOOF
PASTERN

Transparency II-8-F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PARTS OF A HORSE

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STANDARD FFA PLACING CARD Form 2

Contest______________________________

Class Name______________________________

Class No.______________________________

Contestant Name______________________________

Contestant No.______________________________

Tabulator's Score______________________________

PLACINGS	CHECK PLACING
1-2-3-4	
1-2-4-3	
1-3-2-4	
1-3-4-2	
1-4-2-3	
1-4-3-2	
2-1-3-4	
2-1-4-3	
2-3-1-4	
2-3-4-1	
2-4-1-3	
2-4-3-1	
3-1-2-4	
3-1-4-2	
3-2-1-4	
3-2-4-1	
3-4-1-2	
3-4-2-1	
4-1-2-3	
4-1-3-2	
4-2-1-3	
4-2-3-1	
4-3-1-2	
4-3-2-1	

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT II: Methods of Evaluating Livestock

LESSON 9: Fitting and Showing Livestock

I. Preparation and Instruction

A. Student Objectives

1. Terminal: Train, groom, and show livestock.

2. Specific:

a. Define new terms.
b. List advantages of showing livestock.
c. Identify factors for consideration in selecting show animals.
d. Identify the feeding, grooming, and training of selected livestock classes.
e. Identify the health and vaccination requirements for selected livestock classes.
f.

g.

h.

B. Review Teaching Material

1. Ensminger, M.E. The Stockman's Handbook. 5th. Edition, Danville: Interstate Publishers, 1978.

2. A Basic Program in Animal Science, Louisiana State Department of Education and LSU School of Vocational Education, October, 1969.

3. Fit and Show Your 4-H Beef Calf, LSU Cooperative Extension Service, Publication 1256.

4. Feeding and Caring For Your Lamb, LSU Cooperative Extension Service, Publication 1412.

5. Your 4-H Poultry Project, LSU Cooperative Extension Service, Publication 1716.

C. Special Arrangements

1. Materials - livestock or fair catalog for current year.
2. Travel - field trip to local fair or livestock show
3. Audio-visual equipment -- show slides on grooming of livestock.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Present to class pictures of the ideal type for various classes of livestock.

Discuss with the class any variations identified. Relate the changes to the progress in showing of livestock.

B. Content Outline

1. Terms

   a. Feeding

      1) Full feed -- when an animal is getting all it will clean up in 30 minutes to an hour.
      2) Palatable -- agreeable to the taste.
      3) Bulky -- A great bulk or size, e.g., oats, hay, etc.

   b. Grooming

      1) Pliable -- flexible in disposition or character.
      2) Clipping -- that which is clipped off or out of something.
      3) Rinsed -- washed lightly with water.
      4) Scurf -- bran-like material which becomes detached from the epidermis in thin dry scales.

   c. Training

      1) Pose -- to place in a studied attitude with attention to posture and arrangement.
      2) Handle -- to touch, take up, move, or otherwise affect with the hand.
      3) Parading -- to exhibit in a showy manner.
      4) Lead -- to proceed and direct in movements.

   d. Health and vaccinations

      1) Certificate -- document certifying that the animal meets health requirements.
      2) Veterinarian -- a professional who is skilled in treating diseases and injuries of animals.
      3) Infection -- communication of a disease from one animal to another.
      4) Contagious -- communicable by contact.
      5) Permits -- written license given by one having authority.
      6) Tatooing -- marking or figuring.

e. Showmanship

1) Stroking -- to rub gently in one direction.
2) Sportsmanship -- conduct becoming to a sportsman involving honest rivalry and graceful acceptance of results.
3) Placing -- to put in a particular position, as in rank.
4) Clockwise -- in the direction in which the hands of a clock rotate.
5) Counterclockwise -- in the direction opposite to that in which the hands of a clock rotate.
6) Set up -- exhibiting animal for the judge.

2. Advantages of showing livestock

a. Affords a medium for molding breed type.

b. Provides an incentive to breed better animals.

c. Offers an opportunity to study the progress being made within other breeds and classes of livestock.

d. Serves as an advertising medium for both the breed and the breeders.

e. Gives breeders an opportunity to exchange ideas.

f. Sets sale values for the animals back home.

3. Factors for consideration in selecting show animals

a. Type -- Should be carefully evaluated to conform to the current standards for the competition involved.

b. Age and show classification -- Select animals as old as possible within the respective age classifications allowing the animal the best advantages.

c. Breeding -- Animals selected for show should be from good ancestry, for this is added assurance of satisfactory future development.

4. General rules for feeding, grooming, training, health requirements, and showing.

   a. Feeding

      1) Practice economy but avoid false economy.
      2) Use care in getting animals on full-feed.
      3) Provide a variety of feeds.
      4) Feed a balanced ration.
      5) Do not overfeed.
      6) Do not underfeed.
      7) Full-feed for economical fattening.
      8) Supply palatable feeds.
      9) Ration must not be too bulky.
      10) Do not feed damaged feeds.
      11) Feed regularly (same time or times each day).
      12) Avoid sudden changes.
      13) Provide minerals.
      14) Provide exercise.

   b. Grooming and training

      1) Necessary for the judge to see the animal at its best.
      2) Feet should be properly trimmed and cleaned.
      3) Brushing is necessary to remove dirt and maintain the condition of hair and skin.
      4) Clipping is necessary to emphasize desirable traits.
      5) Washing keeps the animals clean and keeps the skin smooth and mellow.
      6) Train the animal months before entering the ring.

   c. Providing health certificate

      1) Required for show animal involved in interstate shipment.
      2) The certificate indicates that within specified days prior to exhibition, the animal was examined and found free of infections or contagious diseases and had the required vaccinations.
      3) Must be signed by a licensed veterinarian.

d. Showing

1) Dress neatly.
2) Enter the ring promptly when the class is called.
3) Pose the animal correctly.
4) Watch judge and animal carefully.
5) Keep calm and collected.
6) Be courteous and respect the rights of the other exhibitors.

e. Some safety measures to be observed

1) Use proper equipment such as trimming table, chutes, and halter.
2) Train animals gradually and well ahead of show time.
3) Use appropriate vehicles for transportation.
4) Secure animals properly when moving.

f. Some of the equipment needed for show

1) Show halter
2) Rope halter
3) Cleaning equipment
    a) Soap
    b) Scrub brush
    c) Hose
    d) Curry comb
4) Blanket (dairy and sheep)
5) Water and feed buckets
6) Show box
7) Clippers and shears
8) Comb
9) Fan
10) Dryer
11) Showstick
12) Hoof trimmers
13) Rasp and nippers
14) Nose tongs (for bulls)

C. Suggested Student Activities

1. Write county agent in parish and request local, district, and state show schedules.

2. Bring in an animal for demonstration for grooming and showing.

3. Attend any livestock show being conducted in local area.

D. Suggested Study Questions

1. What are some advantages of showing livestock?
2. Define showmanship.
3. What are the factors to consider in selecting animals for show?
4. Why is a health certificate required of animals before being transported to a livestock show?
5. Explain the procedure for obtaining a health certificate.
6. What are some general practices to follow in feeding livestock for show?
7. What are some safety measures to follow when training and grooming for show?
8. List some equipment used in training and grooming livestock.
9. How should the exhibitor dress and conduct himself in the show ring?
10. What is the proper procedure for handling animals in the show ring?

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT III: Introduction to Diseases and Parasites of Livestock

LESSON 1: Types of Livestock and Poultry Diseases and Methods of Control

I. Preparation for Instruction

   A. Student Objectives

      1. Terminal: Recognize good or ill health and offer a suggested prevention or control measure.

      2. Specific:

         a. Define new terms.
         b. List signs of good health.
         c. List signs of ill health.
         d. Identify causes of disease.
         e. List factors for a general program of animal health and disease prevention.
         f.

         g.

         h.

   B. Review Teaching Material

      1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

      2. Animal Science 2, LSU Cooperative Extension Service, Publication 1764.

   C. Special Arrangements

      1. Materials

         a. Student notebook

         b. References cited

c. Sample of animal health product and instructions for its use.

d. Instruments (nose tongs, dehorner, hypodermic needles, compressed air spray tank, bolus gun, etc.).

2. Field -- Arrange a demonstration of the procedure for conducting health care practices (worming, spraying, cleaning, vaccination, etc.).

3. Overhead projector and transparencies.

II. Presentation of Lesson

A. Motivation.

Explain the changes in livestock handling, numbers, and production demands, that have created opportunity for disease. A general knowledge of animal health is necessary in assisting the stockmen in prevention of disease.

B. Content Outline

1. Terms

   a. Bacteria -- Small one-celled plants. Those that cause disease are known as pathogens. They are microscopic, vary in shape, multiply by transverse fission, and possess no chlorophyll.

   b. Viruses -- Minute disease-producing organisms which are sometimes classified as animal or plant.

   c. Disease -- An alteration in the condition of the body or any of its organs that interferes with the normal functioning of the body or any of its parts.

   d. Contagious -- Capable of being passed from one organism to another by contact.

   e. Infection -- A disease producing substance, germ, or bacteria.

   f. Eradication -- The act of doing away with or killing out.

   g. Quarantine -- Isolation of an animal sick with a contagious disease.

   h. Lethal -- Deadly.

   i. Sanitation -- Cleanliness.

   j. Prevention -- The act of preventing or hindering.

   k. Communicable -- Capable of being conveyed, transmitted, or imparted.

   l. Toxic -- Poisonous.

   m. Symptoms -- Any perceptible change in the body or its functions indicating a diseased condition.

   n. Disinfectant -- An agent that destroys germs and bacteria.

   o. Contamination -- The pollution of substances with harmful agents.

117 p. *Vaccination* -- The injection of some agent into an animal in order to prevent a disease.

q. *Drugs* -- Substances of mineral, vegetable, or animal origins used in the relief of pain or for the cure of disease.

r. *Immunity* -- A high degree of resistance to disease.

s. *Biologics* -- Medicinal preparations made from microorganisms and their products (vaccines, bacterins, serums).

t. *Bacterins* -- Standardized suspensions of bacteria that have been killed by heat or chemical means and are unable to produce disease. They produce an active immunity.

u. *Vaccines* -- Suspensions of live microorganisms that have had their pathogenic properties removed but their antigenic properties retained.

v. *Serums* -- Substance obtained from the blood of animals that have developed a solid immunity; they do not contain any of the live organisms. They are used for the protective nature of the antibodies that they contain, which stops the action of an infectious agent or neutralizes a product of that agent.

w. *Antitoxins* -- A toxin heated chemically to remove toxic properties but retain the power to stimulate body cells in forming antibodies.

x. *Pathogen* -- disease producing organism.

2. Signs of Good Health

   a. Contentment

   b. Alertness

   c. Eating with relish and cudding by ruminants

   d. Sleek coat and pliable and elastic skin

   e. Bright eyes and pink eye membranes

f. Normal feces and urine

g. Normal temperature, pulse rate, and breathing rate (Transparency III-1-A)

3. Signs of Ill Health

   a. Abnormal discharges from nose, mouth, and eyes

   b. Swelling under the jaws

   c. Unusual posture or extreme nervousness

   d. Persistent rubbing or licking

   e. Dull hair coat and dry, scurfy skin

   f. Altered social behavior

   g. Sudden drop in production

   h. Discoloration of the skin

4. Causes of Disease

   a. Communicable or contagious diseases -- Caused by germs or microscopic living organisms that can be spread by contact from animal to animal (pathogenic organisms). Not all diseases caused by a pathogenic organism are contagious.

      1) Viruses
      2) Bacteria
      3) Fungi
      4) Protozoa

   b. Non-communicable or non-contagious -- Usually caused by something other than germs.

      1) Nutritional defects -- result from unbalanced rations.
      2) Physical defects -- improper functioning of body parts.
      3) Poison -- chemical, animal, or plant agents that affect the animal.

5. Factors for a general program of disease prevention and control. (Transparencies III-1-B,C,&D)

    a. Good management practices

    b. Handling livestock

    c. Adequate living quarters

C. Suggested Student Activities

1. Compile a booklet listing the major diseases, their symptoms, prevention, and control for various classes of livestock.

2. Outline an immunization program for various classes of livestock.

3. Prepare a presentation for the use of biologics.

4. Write an explanation as to how animal diseases affect the economy.

5. Prepare an exhibit displaying an on-the-farm medicine cabinet.

D. Suggested Study Questions

1. Define all new terms found in lesson.

2. List and describe the six signs of good health.

3. List and describe the six signs of ill health.

4. Discuss contagious and non-contagious causes of disease.

5. Discuss a good general program for disease control and prevention.

NORMAL BODY TEMPERATURE OF FARM ANIMALS

ANIMAL	DEGREE F-AVERAGE	DEGREE F-RANGE
CATTLE	101.5	100.4-102.8
SHEEP	102.3	100.9-103.8
GOATS	103.8	101.7-105.3
SWINE	102.6	102.0-103.6
HORSES	100.5	99.0-100.8
POULTRY	106.0	105.0-107.0

TRANSPARENCY III - 1 - A

HANDLING LIVESTOCK

Use canvas slappers rather than clubs or whips

Eliminate protruding nails and broken boards

Remove machinery and equipment from the feedlot

Dehorn cattle

Use proper bedding in barns and trucks

Load animals slowly and carefully

Load wisely - use partitions to separate classes of livestock

Protect livestock from weather

Transparency III-1-B

LIVING QUARTERS

PROVIDE ADEQUATE SPACE FOR ALL ANIMALS

PROVIDE ADEQUATE FRESH AIR AND CONTROL TEMPERATURE

PROVIDE ADEQUATE DRAINAGE AND DRY, CLEAN QUARTERS

ROTATE PASTURES

USE DISINFECTANTS AS NEEDED

Transparency III-1-C

GOOD MANAGEMENT PRACTICES

- ISOLATE, FOR THREE TO FOUR WEEKS, ANIMALS TO BE ADDED TO THE HERD
- FOLLOW A SOUND IMMUNIZATION PROGRAM
- PROVIDE CLEAN HEALTHY SURROUNDINGS
- PROVIDE NUTRITIONALLY ADEQUATE RATIONS
- KEEP VISITORS AND NEW ANIMALS OUT OF LIVESTOCK AREA
- GET AN ACCURATE DIAGNOSIS OF DISEASES THAT OCCUR
- CONSULT A VETERINARIAN WHEN A HEALTH PROBLEM ARISES
- HANDLE LIVESTOCK PROPERLY

Transparency III-1-D

INFORMATION SHEET III-1-A

VII. Diseases

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Brucellosis	Cattle, sheep, swine, and man	Abortion; retained placenta; repeat breeders	Slaughter infected animals; calfhood vaccinate
Leptospirosis	Cattle, sheep, swine, and man	Abortion; loss of appetite; feverish; heavy breathing; bloody urine; calves may be born, but are weak and death may occur	Perform blood test; vaccinate all animals; isolate new animals
Vibriosis	Cattle and sheep	Abortion; low conception; temporary infertility	No treatment available; use antibiotics; sexual rest
Trichomoniasis	Cattle	Abortion; low conception; repeat breeding; inflammation of uterus	Sexual rest cows for 3 months after abortion; market infected bulls
Vaginitis	Cattle	Tissue of vagina reddish, roughened, and granular in appearance	Use artificial insemination; purchase clean animals
Blackleg and Malignant edema	Cattle; less frequently sheep	Sudden sickness or death; high fever; lameness; swelling of muscles; crackling sound may be heard when areas are touched	Burn or bury carcasses; vaccinate sheep 2-4 weeks before shearing, castrating, and docking; vaccinate all calves
Anaplasmosis	Cattle; sheep to lesser extent	Animals become weak and lag behind herd; skin becomes pale around eyes, on the muzzle, lips, and teats, and then turns yellow	Vaccinate all animals in winter months; keep animals from brushy areas; control flies, ticks, and mosquitoes; may cause neonatal anemia; will not control an outbreak
Foot rot	Cattle and sheep	Lameness; reddening and swelling of skin above hoof between toes	Move animal to dry quarters; trim inflamed foot and wash with warm soapy water; sulfa drugs and antibiotics are effective in treating

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Cancer eye	Cattle	A small tumor on eyelid or eyeball; irritation around eye	Early diagnosis followed by surgery; slaughter
Pink eye	Cattle and sheep	Watering and squinting of eyelid; severe reddening of membrane	Isolate affected animals; use antibiotics for control
Milk fever	Cattle, sheep, and swine	Occurs one to two days before or soon after giving birth; loss of appetite; constipation; nervousness; head usually turned back	Keep good supply of vitamins and minerals available; treat with an injection of calcium glucose intravenously
Erysipelas	Swine	Purple patches under belly; stiff, swollen knees and hocks	Isolate all sick animals; clean and disinfect pens; vaccinate once or twice a year; use antibiotics for control
Cholera	Swine	Sudden onset; fever; loss of appetite; weakness; drinking considerable water; belly may be purplish red color; coughing is often evident	Isolate new animals coming into the herd; do not feed uncooked garbage
Swine influenza	Swine	Loss of appetite; become distressed; difficult breathing; discharge from eyes; cough is deep and loud; high fever for a few days	Provide warm, clean, well-ventilated quarters and ample supply of fresh water; use antibiotics
Shipping fever	Cattle, sheep, and swine	High fever; discharge from eyes; hacking cough; difficult breathing; sometimes swelling in region of neck	Provide good feeding and management; vaccinate three weeks before stressing cattle

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Pneumonia	Cattle, sheep, and swine	High fever; quick, shallow breathing; loss of appetite; crackling noise with breathing; discharge from nostrils	Isolate sick animals; practice good, sound husbandry; use sulfa drugs and antibiotics
Mastitis	Cattle, sheep, and swine	Acute: udder becomes hot, very hard, and tender; increase in temperature; milk flow reduced and watery Chronic: milk thick or lumpy Sheep: discharge from teats or gangrene (blue bag)	Eliminate source of udder injury; provide clean bedding; use antibiotics
Warts	Cattle	Growths on the skin varying from very small to large, appearing around teats and head	Isolate cattle; clean and disinfect pens; vaccinate cattle to remove warts
Bloat	Cattle and sheep	Enlarged paunch noticeable on the left side	Keep animals on feet and moving; use stomach pump; feed dry hay before turning in to green, lush pasture
Prussic acid	Cattle	Staggered walking; animals will go down quickly	Keep cattle from grazing frost- or drought-damaged Johnson grass or Sudan grass; prompt treatment will result using nitrate boluses
Anemia	Cattle, sheep, and swine	Loss of appetite; slow and inefficient gains; death	Provide adequate amounts of nutrients; vaccinate suckling pigs
Founder	Cattle, horses, and sheep	Extreme pain; high fever; dropping of hoof soles; turning up of toe walls	Avoid overfeeding of the animal; severe cases should be destroyed; vaccinate early affected animals
Rickets	Cattle, sheep, and swine	Enlargement of the knee and hock joints; bowed legs	Provide sufficient calcium, phosphorous, and vitamin D

INFORMATION SHEET III-1-A (cont'd)

DISEASE	SPECIES AFFECTED	SYMPTOMS	TREATMENT AND CONTROL
Red nose	Cattle	Cough; loss of appetite; loss of weight; nasal discharge; rapid breathing; high fever	Vaccine available; practice good sanitation
Ketosis	Cattle and sheep	Cows: Loss of weight and appetite; decline in milk production Sheep: Weakness; frequent urination; trembles when exercised; death usually occurs in 90% of the cases	Glucose injection; feed well-balanced ration; add molasses ration
Transmissible gastroenteritis	Swine	Scouring and vomiting; disease spreads rapidly	No effective treatment available; practice good sanitation; move farrowing grounds
Tuberculosis	Cattle, sheep, and swine	Very few symptoms; coughing; labored breathing	Practice good sanitation; test and slaughter reactor animals
Atrophic rhinitis	Swine	Starts with baby pigs; show signs of sneezing; snout twisted or distorted	Select replacements from clean herd; slaughter infected animals; SP 250 in feed.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT III: Introduction to Diseases and Parasites

LESSON 2: Types and Control of Livestock Parasites

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Recognize parasite infested animal and recommend a possible action or control.

2. Specific:

   a. Define new terms.
   b. Outline the classification of parasites.
   c. List the general symptoms of heavily parasitized animals.
   d. Identify the principles involved in the control of common parasites.
   e. List methods of controlling parasites.
   f.

   g.

   h.

B. Review Teaching Material

1. Ensminger, M.E. The Stockman's Handbook. 5th. Edition, Danville: Interstate Publishers, 1978.

2. A Basic Program in Animal Science, Louisiana State Department of Education, LSU School of Vocational Education, October, 1969.

C. Special Arrangements

1. Acquire samples of common animal parasites.

2. Display popular medications and equipment used in control of parasites.

3. Display current extension publication regarding animal health.

4. Arrange for field trips to farms observing how parasites are controlled.

5. Overhead projector and transparencies.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Indicate that the prevention and control of parasites are the quickest, cheapest, and most dependable methods of increasing production with no extra animals, no additional feed, and little labor. Although losses due to parasites can be reduced by effective medication and the use of sound control measures including good sanitation, the parasites must first be recognized.

B. Content Outline

1. Terms

   a. Parasite -- An organism living in or on another at the expense of the other.

   b. Host -- Serves as a residence for a parasite.

   c. Insect -- A class of small animals with three pairs of legs which usually have wings.

   d. Transmitting -- The act of passing from one place or animal or insect to another.

   e. Microorganism -- A minute organism, very small.

   f. Cattle grub -- The larvae stage of the heelfly.

   g. Horsefly -- Large two-winged insect that is a parasite to livestock.

   h. Deerfly -- Biting, bloodsucking insect that is usually smaller than a horsefly.

   i. Screwworm fly -- Adult stage of larvae which lays its eggs in injured flesh of animals and sometimes man.

   j. Hornfly -- Small European two-winged fly which clusters about the horns of cattle.

   k. Heelfly -- A small two-winged fly; the adult of the cattle grub.

   l. Lice -- Small, flattened, wingless parasite usually found on warm-blooded animals, which are specific for a particular class of animal.

   m. Tick -- Eight-legged, bloodsucking parasite.

   n. Mite -- Minute eight-legged parasite found on warm-blooded hosts and are very small that produce mange (scabies, scab, itch).

o. Insecticide -- Chemical substances used to kill insects.

p. Pesticide -- Chemical substances used to kill pests.

q. Spray -- Fine liquid mist or act of applying same.

r. Dust -- Application of dry, finely powdered insecticide.

s. Sanitation -- Preserving or restoring health.

t. Disinfection -- To free from infection; to destroy germs.

u. Life Cycle -- Stages of development through which organisms pass from egg to adult.

2. Classification of Parasites

a. External -- Live on the animal's skin or in its layers. Examples include insects, ticks, and lice. They are transmitted directly from one host animal to another without an intermediate host.

b. Internal -- Live in the digestive tract, liver, lungs, kidneys, and elsewhere in the body. The three major groups of internal parasites are as follows:

1) Roundworms -- The most important group of internal parasites from economic standpoint. The species of greatest concern are found in the digestive tract.

2) Tapeworms -- There are three species of tapeworms of economic importance to the livestock industry. They are of less importance, however, than the roundworms.

3) Flukes -- There are several species of flukes, but the species of importance to the livestock producers is the liver fluke.

3. General Symptoms of Heavily Parasitized Animals

   a. External -- Recognized by observation of insects on the skin and hair of the animals. Typical symptoms are inflammed skin, rough or patchy hair coat, excessive rubbing or scratching against fences or trees, or the animal standing in water or running under brush in an attempt to evade insects. (Information sheet III-2-A)

   b. Internal -- The symptoms in affected livestock may involve a weakened condition, loss of appetite, rough hair coat, enlarged stomach, swellings in the neck and throat, decreased production or growth, loss of weight, anemia, fever, scours, emaciated condition, severe illness, and death. (Information sheet III-2-B)

4. Principles Involved in the Control of Common Parasites

   a. Sanitation (cleanliness)

      1) The premises are kept free of general filth, trash, droppings, etc.
      2) Dead animals are properly disposed of.
      3) Premises and animals, when necessary, are disinfected.
      4) The animals are rotated to clean pastures as the old pastures become infected.

   b. Medication (use of antiparasitic chemicals)

      1) Must be applied to an entire herd or flock as if all are infected.
      2) Must be aimed at the weakest link(s) or stage(s) in the life cycle of a parasite.

5. Methods of Controlling Parasites

   a. Life Cycle -- Refers to the stages of development of the parasites from eggs to adults. A knowledge of the life cycle of parasites is necessary in order to be able to use indirect and direct methods in their control. (Transparencies III-2-A,B,C&D)

b. Indirect Control -- Control of the conditions which help the continuance of the parasite's life cycle.

Example:
1) Disposal of solid and liquid manure.
2) Pasture rotation.
3) Proper cleaning of barns.

c. Direct Control -- A poison (insecticide, pesticide) is introduced into the parasite's life cycle.

Example:
1) Dipping
2) Spraying
3) Back-rub
4) Drenching

C. Suggested Student Activities

1. Students draw and label life cycle of internal and external parasites predominant in local livestock industry.

2. Identify stages of life cycle acceptable for direct control.

3. Outline a program of indirect control for a selected class of livestock.

4. Survey local dealer handling animal health products and compile a list of popular medication trade names.

5. Students will make back-rub for application of insecticides and pesticides for parasite control.

6. Prepare a booklet listing the major diseases, their symptoms, prevention, and control for various classes of livestock.

D. Suggested Study Questions

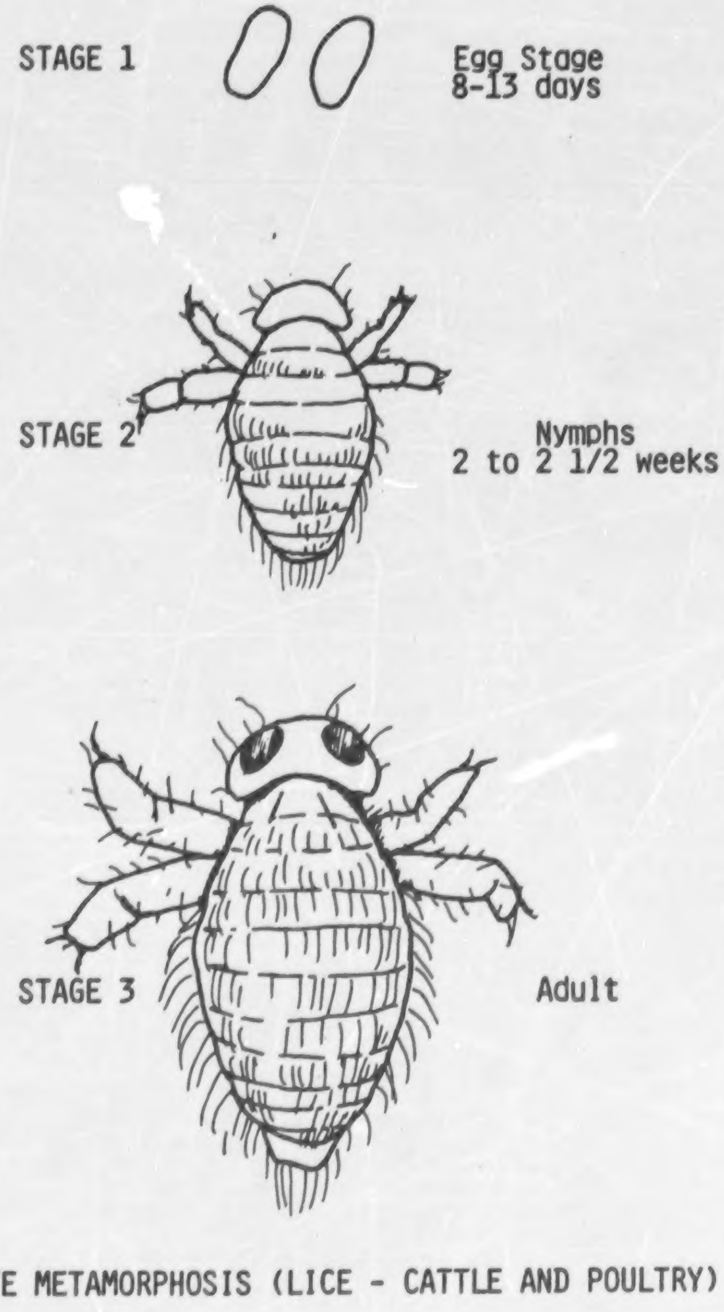
1. Define terms found in lesson.

2. List some examples of external parasites.

3. In what parts of the body are internal parasites normally found?

4. List some internal parasites.
5. What are common symptoms of animals heavily infected with external parasites?
6. What are symptoms of animals heavily infected with internal parasites?
7. List two principles involved in control of parasites.
8. List management practices to be followed in the prevention of internal and external parasites.
9. List basic equipment used in livestock treatment.
10. List basic medication used in livestock treatment.

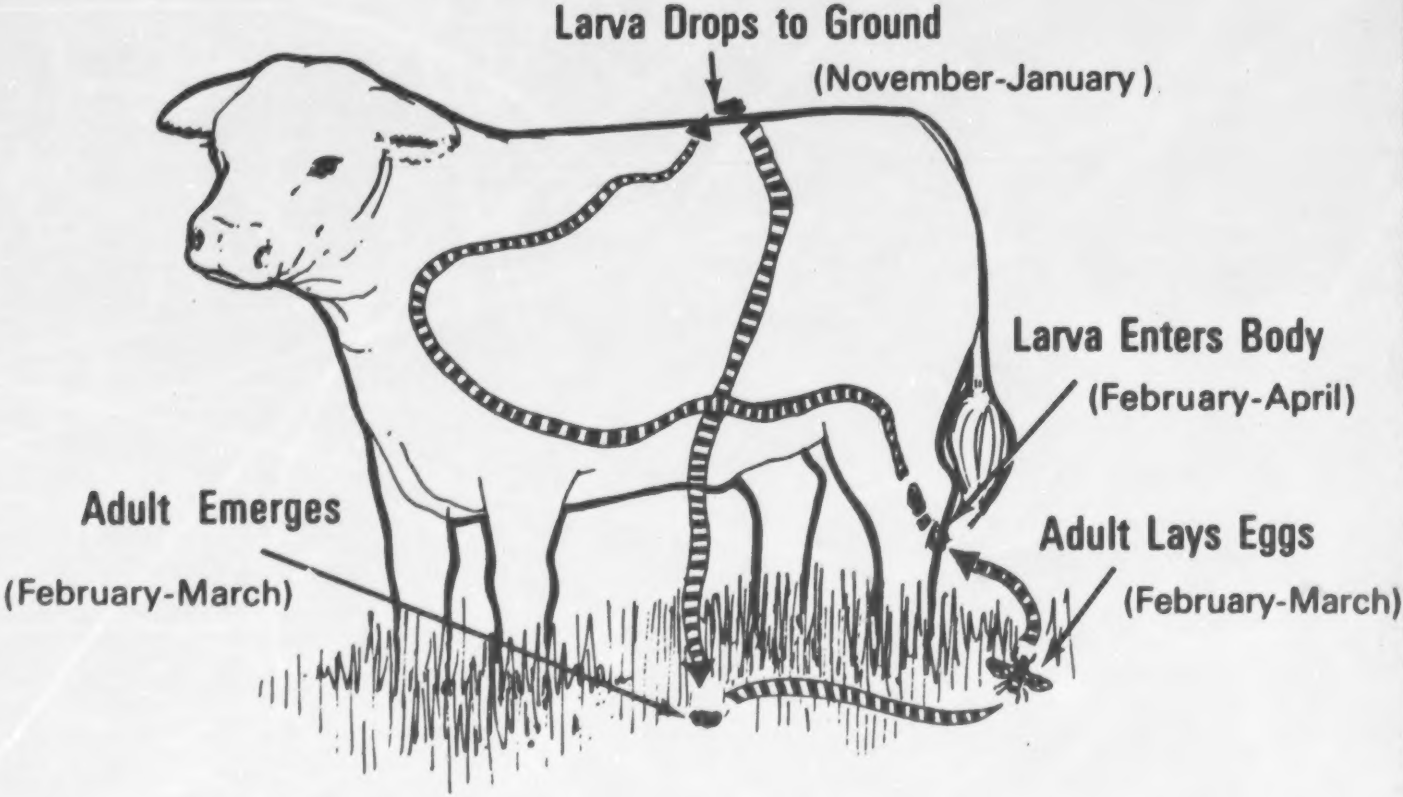
LIFE CYCLE


STAGE 1
Egg Stage
8-13 days
STAGE 2
Nymphs
2 to 2 1/2 weeks
STAGE 3
Adult

INCOMPLETE METAMORPHOSIS (LICE - CATTLE AND POULTRY)

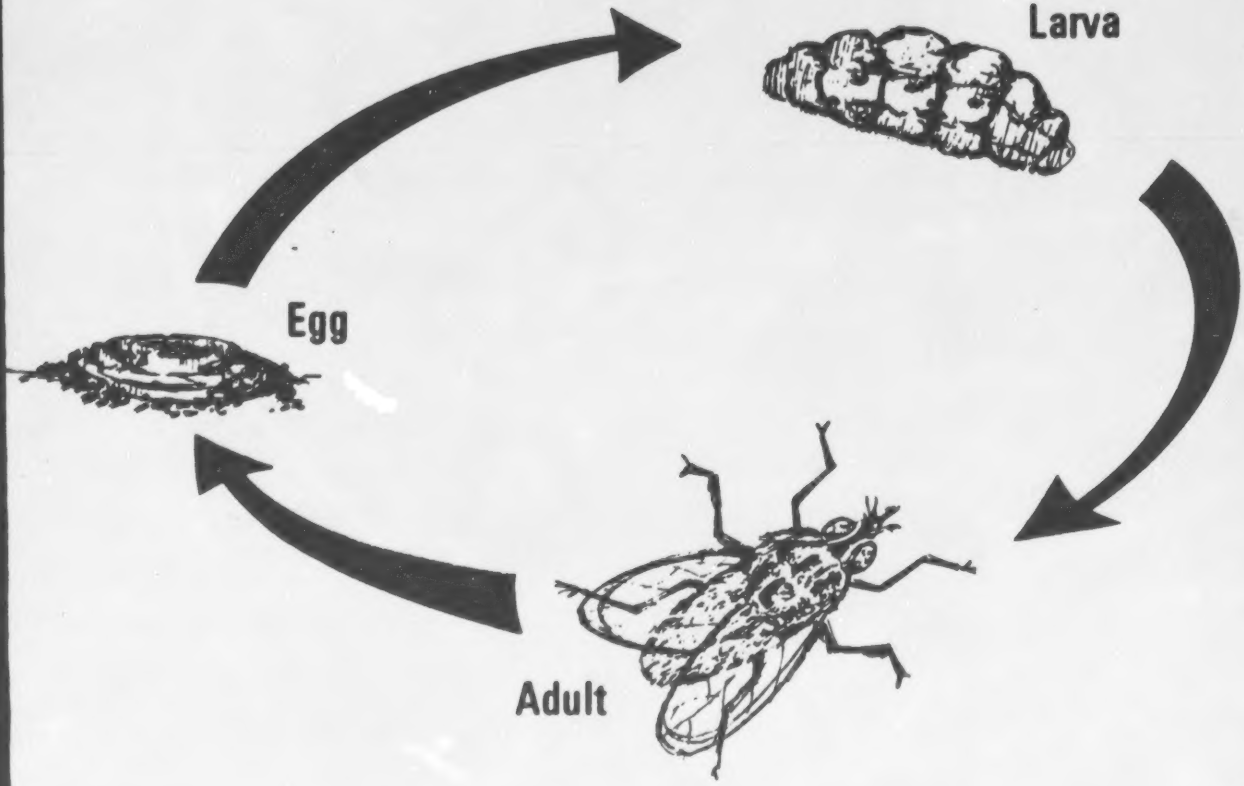
Transparency III-2-A

Life Cycle of the Cattle Grub


Larva Drops to Ground
(November-January)
Larva Enters Body
(February-April)
Adult Emerges
(February-March)
Adult Lays Eggs
(February-March)

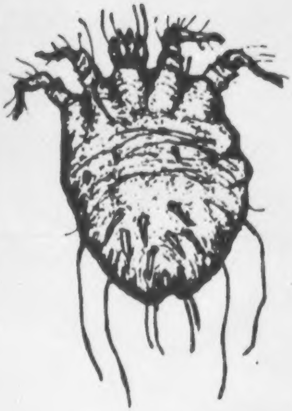
Transparency III-2-B

Life Cycle of the Horn Fly

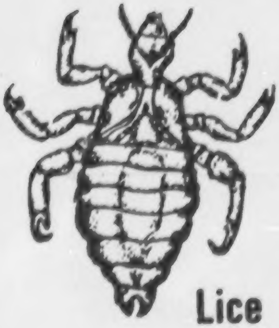

Larva
Egg
Adult

Transparency III-2-C

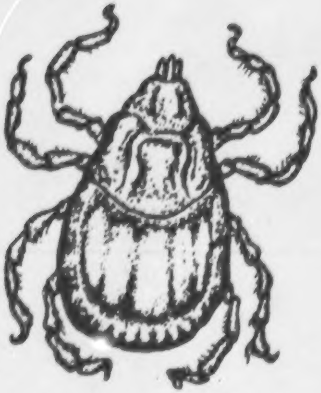
External Parasites



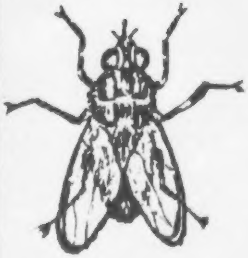
Mite



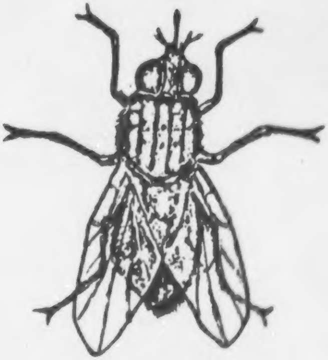
Lice



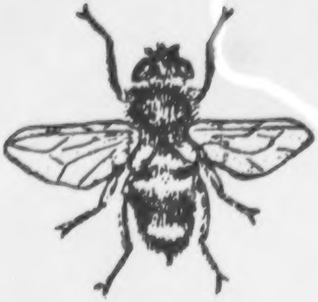
Tick



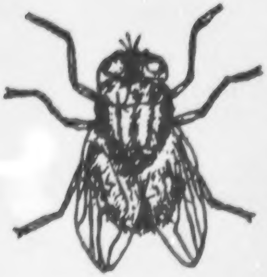
Horn Fly



Barn Fly



Heel Fly



Screwworm Fly

Transparency III-2-D

INFORMATION SHEET III-2-A

VI. Parasites

A. External	Species Affected	Symptoms	Preventions and Controls
Blowfly	Cattle, sheep, and swine	Infected wounds; soiled hair or fleece; animals become weak and fevered	Use proper procedure for destroying dead animals. Use traps, poisoned baits, and repellents.
Horn fly	Cattle	Cattle refuse to graze; seek protection by hiding in buildings, brush, or tall grass	Remove manure from around barn. Spray animals frequently from early May until frost. Use Methoychlor, Toxaphene, Malathion, Ronnel, Co-Ral.
Screwworm fly	Cattle, sheep, and swine	Loss of appetite and poor condition	Branding, dehorning, and castrating during winter months. Keep property free of trash and report all cases to proper authority. Kill larva stage. Use EQ 335 and Co-Ral.
Heel fly	Cattle	Grub (larva) in back of cattle from December to May; swelling in backs of animals	Control flies between June and October. Use Co-Ral; do not use after October 15.
Horsefly	Cattle and horses	Irritation, restlessness, and loss of condition; causes anaplasmosis in cattle	No spray is available, but frequent spraying helps from May until frost. Keep animals from heavy brush areas. Use Pyrethrins.
Tick	Cattle, sheep, and swine	May cause anaplasmosis; weak, weight loss, ears droop	Spray or dust frequently. Use Lindane, Toxaphene, and Malathion.
Lice	Cattle, sheep, and swine	Irritation, restlessness, and loss of condition; some lice cause animals to become anemic	Spray frequently from October until spring. Use Toxaphene, Co-Ral, and Malathion.
Ringworm	Cattle, sheep, swine, and man	Round, scaly areas around eyes, ears, and neck	Isolate affected animals, disinfect equipment, and practice strict sanitation. Apply iodine solution.
Mites and Scabies	Cattle, sheep, and swine	Skin irritated; itching and scratching	Spraying and dipping. Use Lindane, lime-sulfur.

INFORMATION SHEET III-2-B

B. Internal	Species Affected	Symptoms	Preventions and Controls
Coccidiosis	Cattle, sheep, and swine	Diarrhea, bloody feces, and weakness	Avoid contaminated feed and water, isolate affected animals, and keep feeders and waterers sanitary. Consult veterinarian. Use sulfa drugs.
Intestinal worm	Cattle, sheep, and swine	Loss of weight, poor rate of gain, anemia, and/or diarrhea	Rotate pastures, isolate calves and lambs from adult animals, and keep feeders and waterers sanitary. Use Phenothiazine or Thibenzole.
Lungworm	Cattle, sheep, and swine	Coughing, labored breathing, and loss of appetite; young animals become stunted and unthrifty	Practice good sanitation. Do not spread infested manure on pasture. Use Dictycide.
Ascarid	Swine	Coughing and hard breathing; young pigs become unthrifty and stunted; liver damage	Clean farrowing quarters. Wash sows before farrowing; place sows and pigs on clean pasture after farrowing. Use Piperazine, sodium, and fluoride.
Liver fluke	Cattle and sheep	Anemia, digestive disturbances, loss of weight	Avoid wet pastures. Use a good drench of Hexachlorethane-Bentonite mixture.
Stomach worm	Sheep	No specific symptoms	Pasture rotation. Drench with Phenothiazine.
Tapeworm	Cattle, sheep, and swine	No specific symptoms	Pasture rotation. Use copper sulfate-nicotine sulfate.

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT IV: Nutrition of Livestock

LESSON I: Classification and Functions of Nutrients

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Classify and identify by function the nutrients necessary for efficient livestock and poultry production.

2. Specific:

a. Define new terms.
b. List the six classes of nutrients.
c. Identify the function of nutrients.
d. Identify and discuss the functions of feed additives.
e.

f.

g.

B. Review Teaching Material

1. Ensminger, M.E. *Animal Science*. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E. and C.S. Olentine. *Feeds and Nutrition*. Clovis, California: Ensminger Publishing Co., 1978.

3. *A Basic Program in Animal Science*, Louisiana State Department of Education and LSU School of Vocational Education, October, 1969.

4. *Animal Science 2*, LSU Cooperative Extension Service, Publication 1964.

C. Special Arrangements

1. Arrange for visit to local feed mill.
2. Collect feed tags representing various feeds for different growth stages of animal development. Examples: calf starter, calf grower, dry and freshener, milk cow.
3. Overhead projector and transparencies.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

A good understanding of nutrition is important because animals and man are dependent upon nutrients in food for the processes of life. The primary purpose of keeping animals is to transform feeds into meat, milk, eggs, wool, and work (running).

The conversion of feed to these uses must be done efficiently and economically. To do this, the producer must have a knowledge of the nutrients required by animals for growth and reproduction.

B. Content Outline

1. Terms

   a. Nutrients -- Any substance that supports life and makes it possible for animals to produce efficiently.

   b. Essential nutrients -- Nutrients that cannot be synthesized by the animal, but are needed for growth and maintenance.

   c. Non-essential nutrients -- Can be synthesized by the animal and are used for growth and maintenance.

   d. Protein -- The primary growth constituent in feeds.

   e. Crude protein -- The total amount of protein contained in a feed.

   f. Digestible protein -- The percent of the total protein content of a feed that is digested by animals.

   g. Carbohydrates -- A group of feed substances that contain carbon, hydrogen and oxygen and comprise about 75 percent of most rations. They produce energy and are easily digested.

   h. Nitrogen-free extract -- The more soluble and easily digested sugars and starches which are found in corn, sorghum, wheat, barley, rye, and oats.

   i. Crude fiber -- The indigestible carbohydrates associated with plants that are high in fiber.

   j. Fats and oils -- Substances insoluble in water and often referred to as "ether extracts." Also a source of energy.

   k. Minerals -- Non-organic elements which are necessary for proper body functions and life processes.

   l. Vitamins -- Complex chemicals essential for normal body functions.

m. Water -- Necessary for digestion, absorption of food nutrients, removal of body wastes, and the regulation of body temperature.

n. Total digestive nutrient -- T.D.N. -- that portion of a nutrient which may be digestive and taken into the animal's body.

o. Concentrates -- Feed high in Total Digestable Nutrient and low in fiber.

p. Roughage -- Feed high in fiber and low in nutritive value.

2. Classification of Nutrients

a. The nutrients are divided into six classes. (Transparency IV-1-B)

1) Carbohydrates

a) Nitrogen-free extract -- includes sugars and starches. High in food value and low in fiber content and are sometimes defined as concentrates (all grains and molasses).
b) Fiber -- materials low in food value, includes grass, hay, fodder, and roughage.

2) Fats -- Supply large amounts of heat and energy. Cotton meal, soybean meal, peanut meal, and tankage contain various amounts of fat.

3) Proteins -- Made up of various amino acids. During digestion, proteins are broken down into the various acids which are used to produce animal products such as meat, milk, wool, and eggs.

4) Minerals

a) Major minerals -- common salt, calcium, and phosphorus.
b) Trace minerals -- iron, copper, manganese, iodine, cobalt, sulphur, magnesium, zinc, potassium, and boron.

5) Vitamins -- The kind and amount of vitamins needed will vary with the different classes of animals.

6) Water -- Classed as a sixth nutrient. Makes up 56 to 70 percent of the animal's body. Daily Water Consumption Guide for Animals. (Transparency IV-1-A)

3. Functions of Nutrients -- The feed consumption by animals is used for a number of different purposes, the exact usage varying somewhat with the class, age, and productivity of the animal.

   a. Maintenance -- A ration which is adequate to prevent any loss or gain of tissue in the body when there is no production.

   b. Growth -- The increase in size of the muscles, bones, and internal organs and other parts of the body, the foundation of animal production.

   c. Fattening (or show ring fitting) -- The laying on of fat, especially in the tissues of the abdominal cavity and in the connective tissues just under the skin and between the muscles.

   d. Reproduction and lactation -- Inadequate nutrition is a major cause of reproductive failure.

   e. Work (or running) -- Performed primarily at the expense of the carbohydrates and fats of the ration -- energy that can be supplied in the form of additional grain.

   f. Wool -- A high protein product, thus, a shortage of protein in the ration will lessen wool production, even though the total amount of the ration is adequate.

4. Feed Additives -- Feed additives are elements added to livestock feeds to improve growth or prevent disease. It has not been proven that animals need feed additives in order for their bodies to function properly; therefore, feed additives are not considered to be nutrients.

a. Antibiotics -- A chemical substance produced from microorganisms and used to kill other microorganisms.

b. Hormone -- Implant used in cattle and sheep. A chemical substance secreted by the ductless or endocrine glands and transported by the blood or other body fluids. It has a regulatory effect upon the tissues remote from its origin.

c. Arsenicals -- Compounds composed of acids which improve growth and feed efficiency in some classes of swine and poultry.

d. Detergents -- Possibly make certain feeds more digestible, and are used primarily in the feeding of poultry.

e. Tranquilizers -- May aid in animals nutrition. Reduce nervousness and tension.

C. Suggested Student Activities

1. Prepare a display listing the classes of nutrients indicating their role in the functions of nutrients.

2. Collect samples of feedstuffs and classify them.

3. Prepare a demonstration in the use of animal implants (additives).

4. Prepare a report listing vitamins available and their role in livestock rations.

5. Select a class of livestock and outline the role of nutrients for efficient production within that class of livestock.

D. Suggested Study Questions

1. Define terms found in lesson.

2. List the six classes of nutrients.

3. Identify the functions of each of the six classes of nutrients.

4. Identify and discuss the function of feed additives.

A DAILY WATER CONSUMPTION GUIDE FOR ANIMALS (minimum)

SWINE-------------- 2 - 3 gallons per head per day depending on age and size

SHEEP------------- 1 - 2 gallons per head per day

CATTLE (adults)------- 8 gallons per head per day

HORSES------------ 8 gallons per head per day

HENS-------------- 5 gallons per 100 birds per day

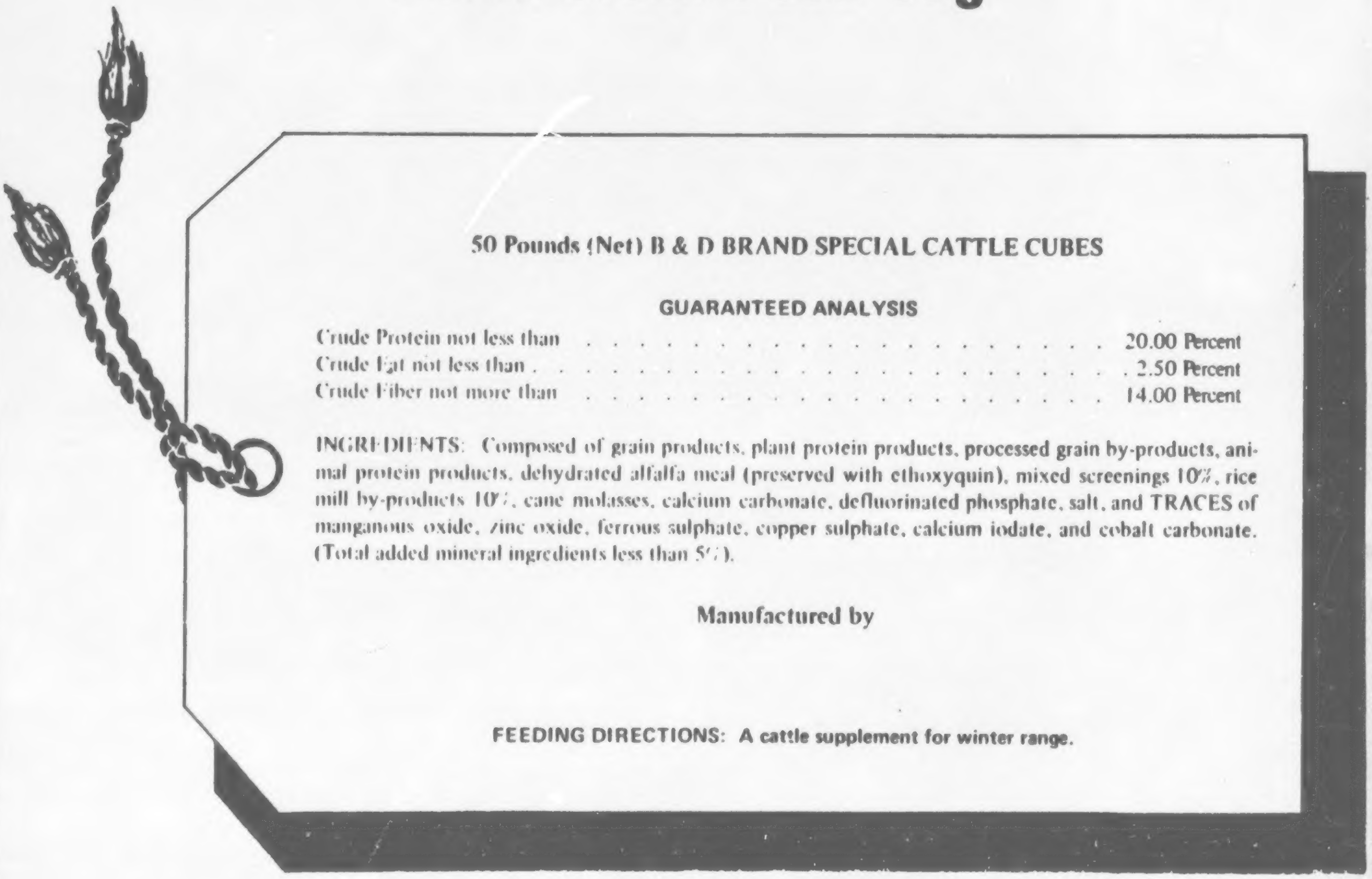
CHICKS------------ vary with age

TURKEYS----------- 7 - 8 gallons per 100 birds per day

TURKEY POULTS----- vary with age

Transparency IV-1-A

Commercial Feed Tag



50 Pounds (Net) B & D BRAND SPECIAL CATTLE CUBES

GUARANTEED ANALYSIS

Crude Protein not less than	20.00 Percent
Crude Fat not less than	2.50 Percent
Crude Fiber not more than	14.00 Percent

INGREDIENTS: Composed of grain products, plant protein products, processed grain by-products, animal protein products, dehydrated alfalfa meal (preserved with ethoxyquin), mixed screenings 10%, rice mill by-products 10%, cane molasses, calcium carbonate, defluorinated phosphate, salt, and TRACES of manganous oxide, zinc oxide, ferrous sulphate, copper sulphate, calcium iodate, and cobalt carbonate. (Total added mineral ingredients less than 5%).

Manufactured by

FEEDING DIRECTIONS: A cattle supplement for winter range.

Transparency IV-1-B

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT IV: Nutrition of Livestock

LESSON 2: Sources of Nutrients

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Classify feedstuffs, identify types, roles, and sources.

2. Specific:

a. Define new terms.
b. Outline the classification and nomenclature of feedstuffs.
c. Identify the sources of feedstuffs available representing the six essential nutrients for a feeding program.
d. State the economic importance of feeds for livestock.
e.

f.

g.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E., and C.G. Olentine. Feeds and Nutrition. Clovis, California: Ensminger Publishing Co., 1978.

3. Morrison, F.B. Feeds and Feeding, 9th. Edition, Clinton, Iowa: Morrison Publishing Co., 1961 or latest edition.

4. A Basic Program in Animal Science. Louisiana State Department of Education and LSU School of Vocational Education, October, 1969.

5. Animal Science 2, LSU Cooperative Extension Service, Publication 1764.

C. Special Arrangements

1. Arrange field trip to equipment dealers and view various forage harvesting equipment.

2. Provide samples for identification purposes of the sources for six essential nutrients.

3. Invite farmers in livestock production to discuss the production cost of feedstuffs and share their experiences for reducing their costs.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Feeds include natural and artificial products that are provided to animals for purposes of (1) sustaining them; (2) increasing production and/or efficiency, providing flavor, adding color, reducing stress; and/or (3) enhancing palatability, bulk, or the preservation of feeds. Choosing the most economical ration is the determining factor between profit and loss.

Most feeds come directly or indirectly from plants that have their roots in the soil. Thus, we have the cycle as a whole--from the soil, through the plant, thence to the animal, and back to the soil again.

B. Content Outline

1. Terms

   a. Feeds -- Naturally occurring ingredients or materials fed to animals for the purpose of sustaining them.

   b. Feedstuff -- Any product of natural or artificial origin that has nutritional value in the diet when properly prepared.

   c. Forage -- Vegetable material in a fresh, dried, or ensiled state which is fed to livestock (pasture, hay, and silage).

   d. Pasture -- An area of land on which there is a growth of forage that animals may graze.

   e. Green chop -- Fresh herbage cut and chopped in the field and fed to animals in confinement.

   f. Hay -- The aerial part of forage crops which is harvested during the growing period and preserved by drying for later use in animal feeding.

   g. Silages and haylages -- Fermented forages stored under anaerobic conditions in a silo.

   h. Concentrates -- Feeds that are low in fiber and high in total digestible nutrients.

   i. High-energy feeds -- Feeds used primarily for their energy content.

   j. Roughage -- Feeds that are high in fiber and low in total digestible nutrients.

   k. Grains -- Seeds from cereal plants.

   l. Protein supplements -- Feedstuffs containing more than 20 percent protein or protein equivalent.

   m. By-product feeds -- Roughages and concentrates other than the primary product from plant and animal processing and from industrial manufacturing.

n. Crop residue -- Refers to that part of a crop which remains following harvesting.

o. Feed supplement -- Feedstuffs used to improve the value of basal feeds.

p. Implant -- A substance implanted into the body for the purpose of growth promotion or controlling some physiological function, e.g., estrus.

2. Classification of Feedstuffs

In general, feedstuffs may be classified into one of the following categories:

a. Forages

b. Concentrates

c. Supplements

d. Additives

3. National Research Council Classification and Nomenclature

a. Dry roughages and forages

1) Hay
2) Legumes
3) Nonlegumes
4) Straw
5) Fodder
6) Stover
7) Other feeds with greater than 18% fiber
8) Hulls, shells

b. Pasture, range plants, and green forages

c. Silages

1) Corn
2) Legumes
3) Grass

d. Energy or basal feeds

1) Cereal grains
2) Mill by-products
3) Fruits

- 4) Nuts
- 5) Roots

e. Protein supplements

- 1) Animal
- 2) Marine
- 3) Avian
- 4) Plant
- 5) Synthetic

f. Mineral supplements

g. Vitamin supplements

h. Non-nutritive additives

- 1) Antibiotics
- 2) Coloring materials
- 3) Flavors
- 4) Hormones
- 5) Medicants

4. Classification of Concentrates
(Transparency IV-2-A)

5. Classification of Roughages
(Transparency IV-2-B)

6. Sources of the six essential nutrients provided to animals through a feeding program.

a. Carbohydrates

- 1) Corn
- 2) Oats
- 3) Wheat
- 4) Rye
- 5) Grain sorghums
- 6) Molasses
- 7) Roughages

b. Fats

- 1) Soybeans
- 2) Peanuts
- 3) Animal fats and oils
- 4) Vegetable oils

c. Proteins

1) Animal
    a) Animal by-products
    b) Blood meal
    c) Fish meal

2) Vegetable
    a) Soybean oil meal
    b) Cotton seed meal
    c) Linseed oil meal
    d) Peanut oil meal
    e) Corn gluten meal
    f) Legume roughages

d. Minerals

1) Feeds (legumes)
2) Protein concentrates
3) Mineral supplements
4) Salt

e. Vitamins

1) Vitamin A -- green roughages, yellow corn, fish liver oil.
2) Vitamin B -- milk and milk products, grains, forage crops.
3) Vitamin B12 -- animal products (meat scraps, fish meal).
4) Vitamin D -- roughages, sunlight.
5) Vitamin E -- all forages, grains and protein concentrates.
6) Vitamin K -- legume roughages.

f. Water -- Product of nature available from streams, lakes, ponds, wells, and green feeds.

C. Suggested Student Activities

1. Collect and label samples of concentrates.

2. Collect and label samples of roughages.

3. Outline a feeding program from birth to age of production for a particular class of livestock.

4. Determine the popular feedstuffs being used by farmers in the local area.

5. Obtain feed cost estimates from local farmers or feed dealers.

D. Suggested Study Questions

1. Define the terms found in the lesson.

2. List the four general classifications of feedstuffs.

3. Identify the sources of feedstuffs representing the six essential nutrients for a feeding program.

4. Discuss the economic importance of feeds for livestock.

5.

6.

CLASSIFICATION OF CONCENTRATES

Grains

- BARLEY
- CORN
- GRAIN SORGHUM
- OATS
- WHEAT
- GROUND EAR CORN

Processing by-products

- WHEAT BRAN
- WHEAT MIDDLINGS AND SHORTS
- RICE BRAN
- ANIMAL FAT, FEED GRADE

Liquid supplements

- BLACK STRAP MOLASSES
- UREA
- BEET MOLASSES
- CITRUS MOLASSES

Plant proteins

- SOYBEAN MEAL
- COTTONSEED MEAL
- LINSEED MEAL
- PEANUT MEAL

Animal proteins

- MEAT SCRAPS
- TANKAGE
- FISH MEAL
- BLOOD MEAL

Transparency IV-2-A

CLASSIFICATION OF ROUGHAGES

DRY ROUGHAGES

Hays--Grass and Legume

Hulls--Peanut and Cottonseed

Straw--Oat, Wheat, Barley, and Rice

Fodder--Corn and Sorghum

GREEN ROUGHAGES

Roots

Grasses

Legumes

Tubers

Fodder

SILAGE

Corn

Sorghum

Grass

Transparency IV-2-B

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT IV: Nutrition of Livestock

LESSON 3: The Digestive Process

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Identify and compare the digestive processes of ruminants, non-ruminants, and fowl, thus assuring proper selection of feeds for each.

2. Specific:

   a. Define new terms.
   b. Label and define essential parts of the digestive system (ruminants, non-ruminants, and poultry).
   c. Trace the pathway of feed for the various digestive systems.
   d. Discuss the digestion of carbohydrates, fats, and proteins.
   e.
   f.
   g.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E., and C.G. Olentine. Feeds and Nutrition. Clovis, California: Ensminger Publishing Co., 1978.

3. Morrison, F.B.; Feeds and Feeding, 9th. Edition, Clinton, Iowa: Morrison Publishing Co., 1961 or latest edition.

4. A Basic Program in Animal Science, Louisiana State Department of Education and LSU School of Vocational Education, October, 1969.

5. Animal Science 2, LSU Cooperative Extension Service, Publication 1764.

C. Special Arrangements

1. Arrange for a visit to a slaughter house.

2. Prepare schematic diagrams for various digestive systems to be issued as information sheets.

3. Overhead projector and transparencies.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Numerous differences can be observed in the anatomy and physiology of digestion in various livestock species which enable them to utilize feedstuffs efficiently.

Thus, animals that consume large amounts of fibrous feeds differ behaviorally and anatomically from animals that consume easily digested feeds.

Therefore, in order to maximize the use of feed, the husbandman and nutritionist must have an understanding of these differences in digestion and absorption.

B. Content Outline

1. Terms

a. Appetite -- Learned or habitual response to the presence of feed.

b. Digestion -- The process whereby proteins, fats, and complex carbohydrates are broken down into units that are small enough to be absorbed.

c. Enzymes -- Organic catalysts produced by certain cells within the body which speed biochemical reactions at ordinary body temperatures without being used up in the process.

d. Mastication -- The act of chewing food.

e. Pharynx -- The structure which controls the passage of air and feed.

f. Esophagus -- A muscular tube extending from the pharynx to the cardia of the stomach.

g. Peristalsis -- The coordinated contraction and relaxation of smooth muscles creating an unidirectional movement which pushes material through the digestive tract.

h. Metabolism -- Breaking down of food products to meet the specific needs of cells.

i. Absorption -- A general term which means the passage of a substance into the blood stream.

2. Types of Digestive Systems

a. Ruminants -- Animals which has a compound stomach consisting of four different compartments (cattle, sheep, goats). (Transparency IV-3-A)

1) The essential parts of a ruminant stomach. (Transparency IV-3-A)

- a) Rumen or paunch -- is the first and by far the largest compartment of the stomach. It serves as a storage area for large quantities of feed, especially roughages, and has a capacity of 40-60 gallons in mature cattle.
- b) Reticulum or honeycomb -- the main function of the reticulum is to retain foreign materials, such as wire and nails, that may cause injury to other body organs. Another important function of the reticulum is to furnish additional storage space.
- c) Omasum -- Sometimes called "manyplies" because of the many folds in its walls. The omasum is used to remove the water from feed and to grind or strain the food very fine.
- d) Abomasum -- The "true stomach," about the same size of the omasum; the only compartment where digestive juices are produced.

2) Pathway of feedstuff in ruminants

- a) As they graze cattle and sheep only partially chew their food.
- b) Ruminants eat to fill their rumen then "chew their cud" later.
- c) Rumen and reticulum act as a holding vat. Feed is stored here for several hours while bacteria partially digest the food.
- d) Coarse feed is regurgitated into the animal's mouth for rechewing.
- e) The rechewed cud is reswallowed and passed down the esophagus into the reticulum. Most of it then goes to the omasum where the water is squeezed out while the feed is being forced into the abomasum. Feed stays in the digestive tract

of cattle and sheep for about 4 days.

b. Nonruminants -- simple stomach (swine, horses). (Transparency IV-3-B)

1) Essential parts of digestive tract of a pig. (Transparency IV-3-B)

a) Duodenum -- The first part of small intestine where food is broken down and absorbed by the villi to be used by the body.

b) Cecum -- Enlarged appendage between the small intestine and large intestine which aids in absorption and storage of fecal material.

c) Colon -- Part of the large intestine between the cecum and rectum.

2) Pathway of feedstuffs in simple stomachs.

a) Do not have a rumen where feed can be stored.

b) Do not ruminate or chew a cud.

c) Must chew feed before it is swallowed.

d) Feed passes down esophagus into the stomach.

e) Feed then passes through the small and large intestines. A simple-stomached animal has rather exacting nutrient requirements. Feed passes through a pig's digestive tract in approximately 24 hours.

f) The digestive system of the horse and its functions may be described as being between the simple system of the swine and the compound system of the cow. The horse's cecum and colon are greatly enlarged, and this enables its large intestine to hold from 120

to 140 quarts of feed.
This capacity allows the horse to consume and digest a large amount of roughage.

c. Fowl -- This system serves for food intake, storage, digestion and elimination of body waste products. (Transparency IV-3-C)

   1) Essential parts of the fowl digestion.

      a) Mouth -- Consists of a beak which is used in tearing apart and picking up food.

      b) Gullet -- The tube leading from the back part of the mouth to the stomach.

      c) Crop -- Enlarged area of the gullet and serves as a temporary storer and softener of food.

      d) Gizzard -- Crushes food particles and mixes them with digestive juices.

      e) Small intestine -- Extends from the gizzard to the large intestine.

      f) Ceca -- Two blind pouches extending forward from their point of connection at the place where the large and small intestine join.

      g) Large intestine -- Extends from the small intestine to the cloaca. It is two times the diameter of the small intestine and about four inches long.

      h) Cloaca -- Enlarged portion of the alimentary tract connecting the large intestine and the vent.

      i) Proventriculus -- Where gastric juices and acids are mixed with the food.

      j) Vent (anus) -- The external opening from the digestive system.

C. Suggested Student Activities

1. Draw and label a schematic diagram of digestive tracts for man, swine, horses, cattle, and sheep.

2. Compile a list of feedstuffs appropriate for each class of livestock and poultry.

3. Trace the passage of feed through the parts of the digestive tract of ruminants, nonruminants, and fowl.

4. Outline the appropriate feeding guide for the livestock and poultry predominant in local area.

D. Suggested Study Questions

1. Define the terms found in lesson.

2. Define the essential parts of the digestive system for
   a. Ruminants
   b. Non-ruminants
   c. Poultry

3. Discuss the digestion of carbohydrates, proteins, and fats.

4. Trace the pathway of food digestion for the various classes of farm animals.

2) Pathway of feedstuffs in fowl

Chickens use their tongues to force feed into the gullet and crop. Salivary action takes place in the crop, and the feed is softened. As the feed travels to the gizzard, stomach gastric juices containing pepsin surround the food to further aid in digestion.

The gizzard, aided by grit and gravel eaten by the chicken, crushes the feed. From the gizzard the feed travels to the small intestine. In the small intestine digestive juices are secreted into the duodenum loop from the pancreas for digestion of carbohydrates, proteins, and fats. The absorption of food takes place in the coiled portion of the small intestine.

3. Digestion of Carbohydrates, Proteins, and Fats

a. Carbohydrate digestion

Cattle digest carbohydrates in their rumen. The carbohydrates not digested in the rumen are digested in the true stomach. Carbohydrates are broken down into fatty acids.

Swine begin the digestion of carbohydrates in their mouths. The enzyme called salivary amylase breaks starches down into sugars. This action is stopped by stomach acid. After reaching the small intestine, carbohydrates are broken down by other enzymes. This process continues until digestion is concluded.

In poultry, carbohydrate digestion starts in the gizzard. Digestion enzymes are secreted in the pancreatic juice and start to break starches down into complex sugars. Sugar splitting enzymes in the small intestine break down the compound sugars into glucose, the end product of carbohydrate digestion. Sugars and starches are easily digested by poultry, but fibers are poorly digested.

147 b. Protein digestion

Proteins contain nitrogen that will combine with other chemical elements in many different combinations. The various combinations result in many different proteins.

The digestion of protein by cattle begins in the rumen. The protein is broken down by rumen bacteria that require amino acids in order to develop and multiply. Ammonia gas produced when protein is broken down and is used by the bacteria to rebuild their bodies. As the bacteria in the rumen die, the protein contained in their bodies is used by the ruminant. Because bacteria in the rumen of cattle can manufacture amino acids from nitrogen, cattle do not require a special balance of amino acids.

Protein digestion begins in the stomach of swine. The enzyme pepsin breaks the protein down and results in the formation of protein chains. In the small intestine, these chains are broken down into amino acids which are absorbed through the walls of the small intestine. Certain amino acids must be provided in swine rations because swine are not able to manufacture them.

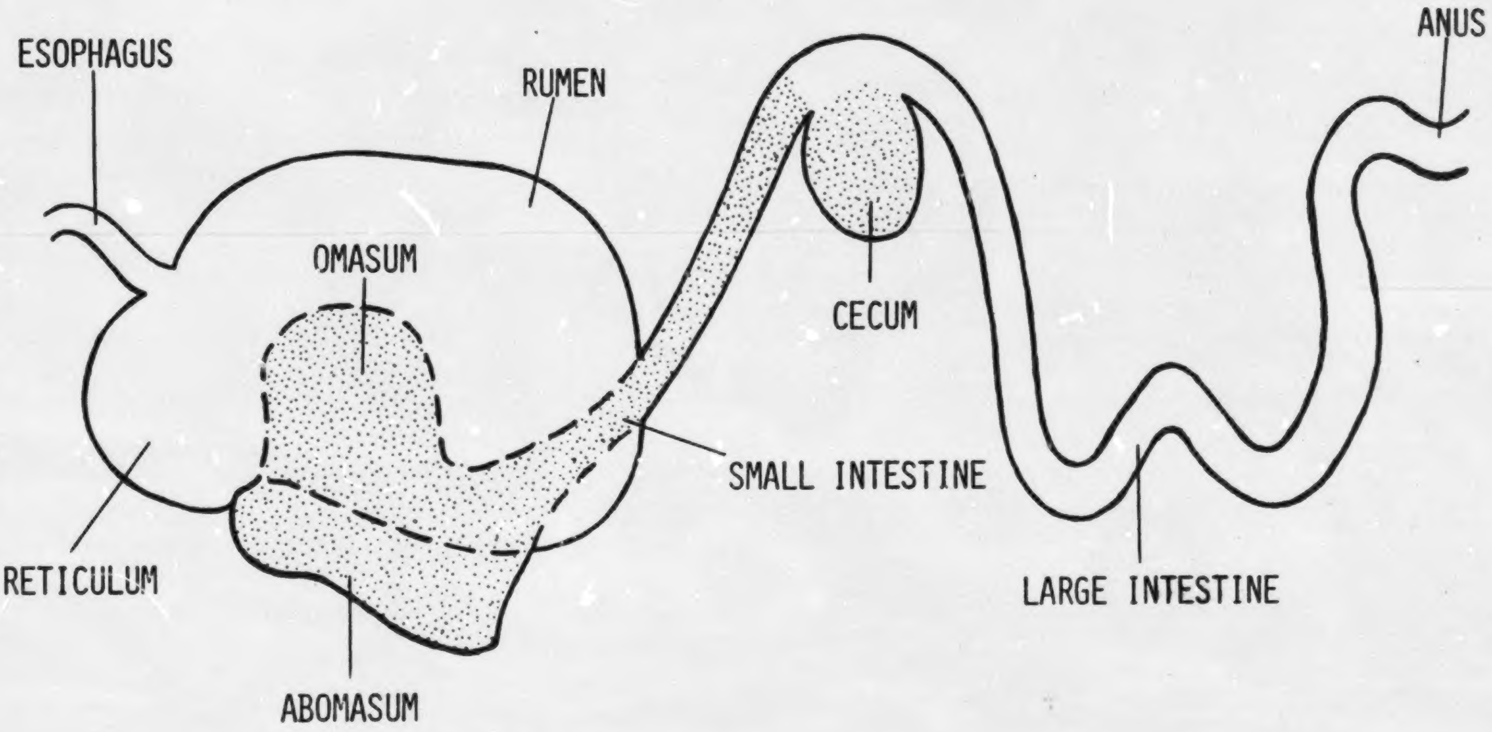
In poultry, proteins are broken down into proteases and peptones during the grinding and mixing done in the gizzard. The secretion of erepsin in the small intestine splits the protein into amino acids and completes the digestion of protein.

c. Fat digestion

In cattle, fats are digested in the abomasum and small intestine. The enzyme gastric lipase breaks fats down into fatty acids and glycerol. Pigs digest fats in the stomach and small intestine.

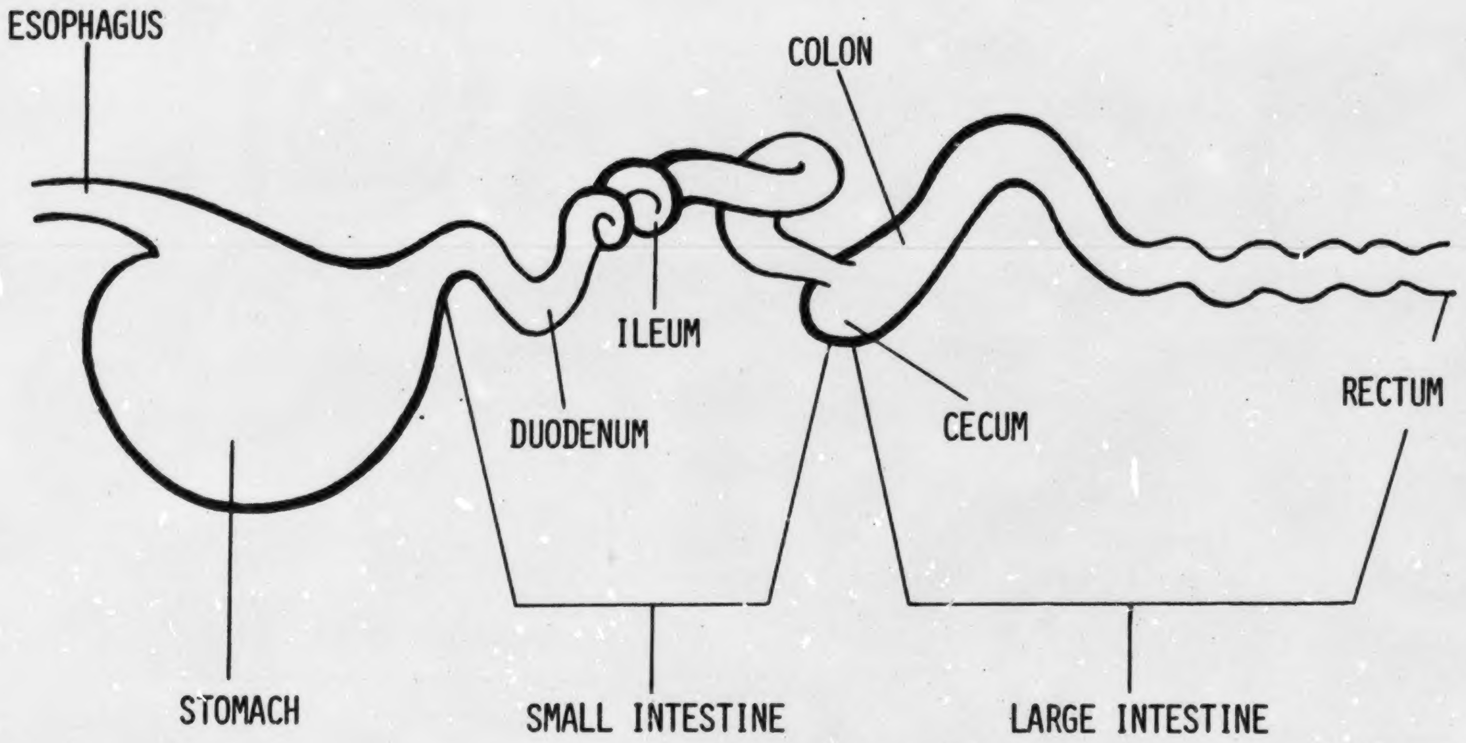
Enzymes in the digestive tract of poultry aid in the digestion of fats but the main function taking place after leaving the crop with the major portion within the small intestine.

ESSENTIAL PARTS OF A RUMINANT STOMACH


ESOPHAGUS
RUMEN
ANUS
OMASUM
CECUM
SMALL INTESTINE
RETICULUM
LARGE INTESTINE
ABOMASUM

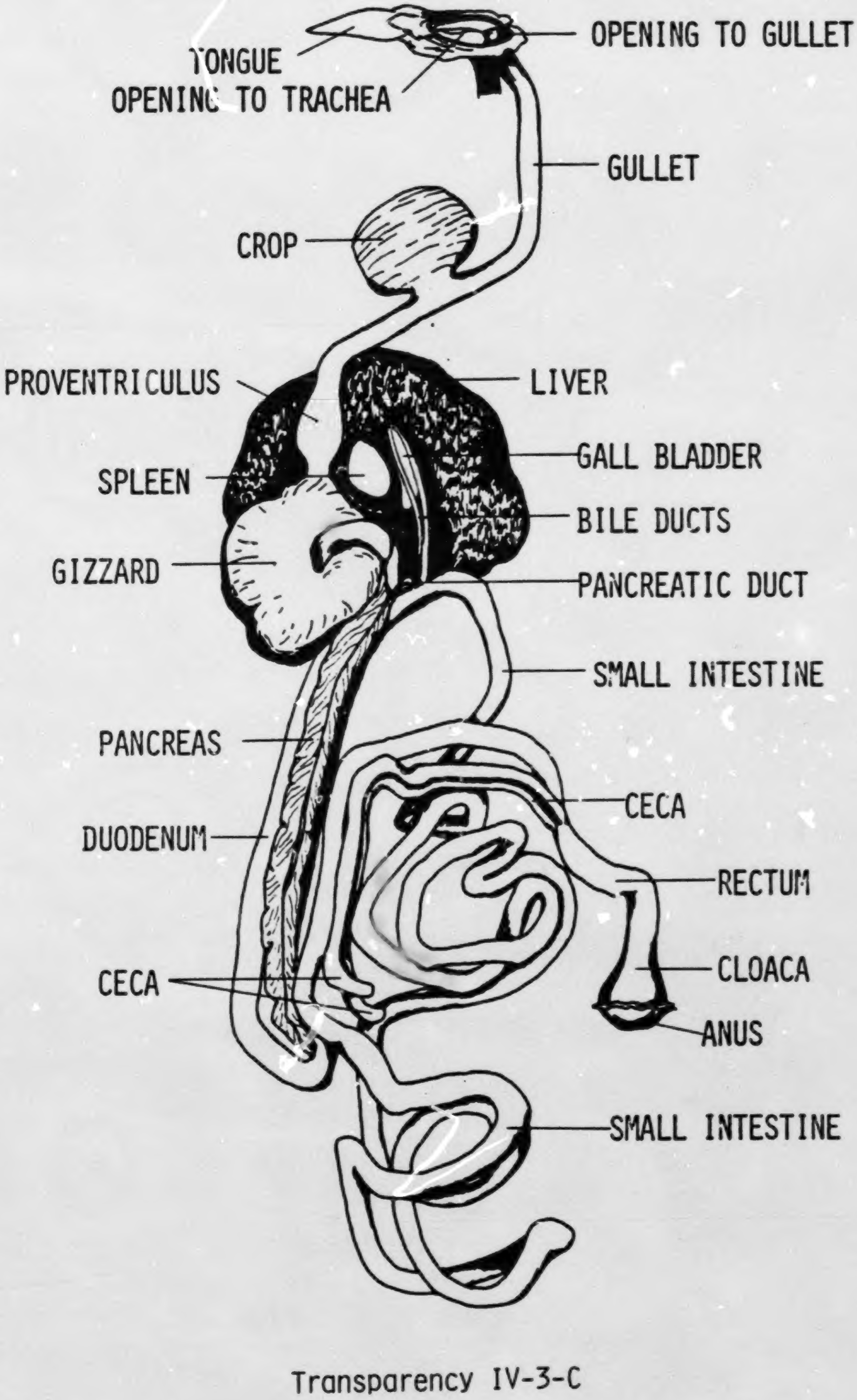
Transrarency IV-3-A

DIGESTIVE TRACT OF A PIG (SIMPLE STOMACH)


ESOPHAGUS
COLON
ILEUM
DUODENUM
CECUM
RECTUM
STOMACH
SMALL INTESTINE
LARGE INTESTINE

Transparency IV-3-B

POULTRY DIGESTIVE SYSTEM


TONGUE
OPENING TO TRACHEA
OPENING TO GULLET
GULLET
CROP
PROVENTRICULUS
LIVER
GALL BLADDER
SPLEEN
BILE DUCTS
GIZZARD
PANCREATIC DUCT
SMALL INTESTINE
PANCREAS
CECA
DUODENUM
RECTUM
CLOACA
CECA
ANUS
SMALL INTESTINE

Transparency IV-3-C

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT IV: Nutrition of Livestock

LESSON 4: Preparation of Rations

I. Preparation for Instruction

A. Objectives

1. Terminal: Prepare balance rations for livestock and poultry feeding.

2. Specific:

   a. Define new terms.
   b. Identify points to consider before attempting to balance a ration.
   c. List the steps in ration formulation.
   d. Identify the methods of formulating rations.
   e. Use the Square Method to balance a a ration.
   f.
   g.
   h.

B. Review Teaching Material

1. Ensminger, M.E., and C.G. Olentine. Feeds and Nutrition. Clovis, California: Ensminger Publishing Co., 1978.

2. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

3. Morrison, F.B. Feeds and Feeding. 9th. Edition, Clinton, Iowa: Morrison Publishing Co., 1961 or latest edition.

4. A Basic Program in Animal Science, Louisiana State Department of Education and LSU School of Vocational Education, October, 1969.

C. Special Arrangements

1. Prepare copies of feeding standards.
2. Prepare worksheet blanks.
3. Prepare copies of feed composition tables.
4. Overhead projector and transparencies.

II. Presentation of Lesson and Suggested Student Activities

A. Motivation

Expanded knowledge of the nutrient requirements of animals and refined feeding standards allow the producer to tailor a feeding program to his particular operation. With revised feeding standards and new analytical techniques used to determine the value of foodstuff, the producer is now able to formulate a balanced ration.

B. Content Outline

1. Terms

   a. Feeding standards -- Tables listing the amounts of one or more nutrients required by different species of animals for specific productive functions.

   b. Balanced ration -- One which provides an animal the proper proportions and amounts of all the required nutrients for a period of 24 hours.

   c. Net energy -- The energy remaining after energy lost in feces, heat increment, combustible gases, and urine.

   d. Ration formulation -- Combining feeds that will be eaten in the amount needed to supply the daily nutrient requirements of the animal. (Transparency IV-A-D)

   e. Ration -- feed consumed during a 24 hour period.

2. Points to consider before attempting to balance a ration.

   a. Availability and cost of the different feed ingredients.

   b. Moisture content of each ingredient.

   c. Composition of feeds under consideration.

   d. Quality of feed as determined by

      1) Stage of harvesting
      2) Freedom from contamination
      3) Uniformity
      4) Length of storage.

   e. Degree of processing of the feed.

   f. Soil analysis where each feed ingredient was grown, if this information is known.

   g. The nutrient requirements and allowances for the particular class of animal.

3. Steps in ration formulation

   a. Find and list the nutrient requirements and/or allowances for the specific animal to be fed.

   b. Determine what feeds are available and list their respective nutrient composition.

   c. Determine the cost of the feed ingredients under consideration.

   d. Consider the limitations of the various feed ingredients and formulate the most economical ration.

4. Methods of ration formulation

   a. Square Method (Transparency IV-4-A)

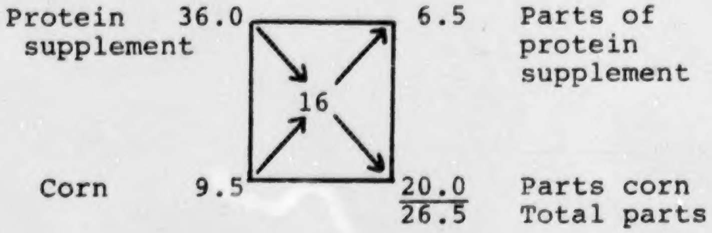
   b. Trial and Error Method

   c. Computer Method

   (Each method of ration formulation may be used in balancing rations for all classes of livestock.

5. Step-by-Step procedure for balancing the protein portion of a ration using the Square Method. (Transparency IV-A-B&C)

   a. Draw a square and place the number 16 (desired protein level) in the center thereof.


Protein supplement
36.0
6.5
Parts of protein supplement
16
Corn
9.5
20.0
Parts corn
26.5
Total parts

b. At the upper left-hand corner of the square, write protein supplement and its protein content (36); at the lower left-hand corner, write corn and its protein content (9.5).

c. Subtract diagonally across the square (the smaller number from the larger number), and record the difference at the corners on the right-hand side (36-16 = 20; 16-9.5 = 6.5). The number at the upper right-hand corner gives the parts of concentrate by weight, and the number at the lower right-hand corner gives the parts of corn by weight to make a ration with 16% protein.

C. Suggested Student Activities

1. Visit feed and seed dealer in local area and obtain feed tags representing the various prepared feed mixtures.

2. Formulate a ration using the Square Method. Example: A swine producer has 40 lb. pigs to which he desires to feed a 16% protein ration until they reach a 120 lb. weight. He has corn on hand containing 9.5% protein. He can buy a 36% protein supplement which is reinforced with minerals and vitamins. What percent of the ration should consist of corn and what percent should be 36% protein supplement?

D. Suggest Study Questions

1. Define the terms found in the lesson.

2. Discuss the points to consider when balancing a ration.

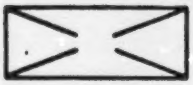
3. List the steps in formulating a ration.

4. Explain method of using the Square to balance a ration.

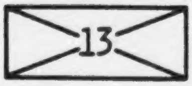
5. Using examples, work problems with the Square.

USING THE SQUARE TO FIGURE RATIONS

STEP NO. 1

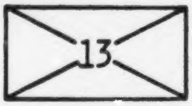


STEP NO. 2



MILO 8.5

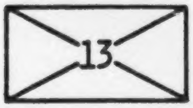
STEP NO. 3 AND 4



C.S.M. 32.2

MILO 8.5 19.2 PARTS OF MILO

STEP NO. 5



C.S.M. 32.2 4.5 PARTS OF C.S.M.

TOTAL PARTS IN MIXTURE 23.7

STEP NO. 6 MILO 19.2 23.7 = .81 x 100 = 81%

COTTONSEED MEAL 4.5 23.7 = .19 x 100 = 19%

Transparency IV-4-A

USING THE SQUARE TO FIGURE A RATION FOR A 600 LB. WINTERING BEEF HEIFER

STEP No. 1 FEEDING STANDARD REQUIREMENTS FOR HEIFER

	D.M.	D.P.	T.D.N.
600 LBS. WINTERING BEEF HEIFER	11.6-13.3	.67-.75	6.3-7.2

STEP No. 2 COMPOSITION OF:

1 LB. OF SUDAN HAY	.894	.043	.486
6 LBS. OF SUDAN HAY	x 6	x 6	x 6
PROTEIN AND T.D.N. SUPPLIED IN 6 LBS OF HAY	XXX	.258	2.916

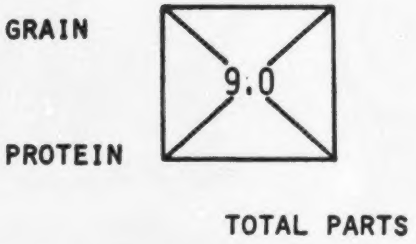
PROTEIN AND T.D.N. TO BE SUPPLIED IN CONCENTRATES, OR DEFICIT PROTEIN AND T.D.N. .49 - 4.3

STEP No. 3 4.3 80 = .054 x 100 = 5.4 LBS. = POUNDS OF CONCENTRATES REQUIRED

STEP No. 4

.09
5.4 .490 x 100 = 9.0 OR 9.0 - PERCENT OF DIGESTIBLE PROTEIN NEEDED IN CONCENTRATE MIXTURE

STEP No. 5



Transparency IV-4-B

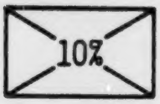
USING THE SQUARE TO FIGURE A COMPLETE RATION

(A 10 PERCENT DIGESTIBLE PROTEIN RATION
IS NEEDED)

STEP NO. 1

STEP NO. 2

9 POUNDS MILO
5 POUNDS COTTONSEED HULLS



1 POUND COTTONSEED MEAL

STEP NO. 3

MILO 9 POUNDS - .765
COTTONSEED HULLS
5 POUNDS - .000
.765

COTTONSEED MEAL
1 POUND 32.2
32.2

STEP NO. 4

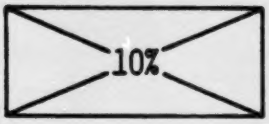
5.4 AVERAGE PROTEIN
14 .765

STEP NO. 5

32.2 AVERAGE PROTEIN
1 32.2

STEP NO. 6

5.4



32.2

22.2 PARTS OF MILO AND COTTONSEED HULLS
4.6 PARTS OF MEAL
26.8 OR 27 POUNDS

STEP NO. 7

22 27 = .81 OR 81 PERCENT MILO AND
COTTONSEED HULLS MIXTURE

5 27 = .19 OR 19 PERCENT COTTONSEED MEAL

Transparency IV-4-C

COMMERCIAL FEED TAG (LABEL EXAMPLE)

a. 100 pounds (net)

b. Red Steer Feeds calf concentrate - 32

c. MEDICATED

d. For maintaining weight gains and feed efficiency

e. DIRECTIONS FOR USE Use at the rate of 10 pounds per 100 pounds of concentrate when feeding to calves

f. ACTIVE DRUG INGREDIENTS Ampicillin

g. GUARANTEED ANALYSIS

crude protein, not less than	32.0 %
crude fat, not less than	3.0 %
crude fiber, not more than	7.0 %
calcium (ca), not more than	1.0 %
phosphorus (p), not less than	1.1 %

h. INGREDIENTS

Plant protein products, animal protein products, processed grain by-products, dehydrated alfalfa meal, etc.

i. MANUFACTURED BY
DOE MILLING CO.
DOE, TX 77777

Transparency IV-4-D

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT V: Principles of Breeding Livestock

LESSON 1: Reproduction of Livestock and Poultry

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Describe the basic reproductive phenomena (fact, event, and circumstance) of livestock and poultry.

2. Specific:

a. Define new terms.
b. List anatomy and functions for the male and female reproductive system (mammals and poultry).
c. Describe the reproductive process for mammals; for poultry. (Includes estrus, ovulation, fertilization, gestation.)
d. Identify causes for reproductive failures.
e. Compare reproduction in poultry with animals.
f. List the advantages and disadvantages of artificial insemination.
g.

h.

i.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E. Poultry Science. 2nd. Edition, Danville: Interstate Publishers, 1980.

3. Animal Science 2. LSU Cooperative Extension Service, Publication 1764.

C. Special Arrangements

1. Acquire anatomy chart of male and female reproductive system for livestock and fowl.

2. Travel

   a. Arrange field trip to local livestock operation where artificial breeding is used as a reproductive tool.

   b. Visit local slaughter house and arrange for examination of reproductive tract from slaughtered animal.

3. Overhead projector and transparencies.

II. Presentation of Lesson

A. Motivation

The life of each animal begins with mating of a male and a female. This process is called reproduction, an orderly, systematic process by which each of the parents makes very definite contributions to the new individual's constitution. The term "reproduction" means the production of young animals to continue the species. Reproduction starts with the union of two tiny cells, one from the female and one from the male. With the joining of these two cells, a zygote is formed, and a new animal is conceived.

B. Content Outline

1. Terms

   a. Protoplasm -- The essential living matter of all animal and plant cells.

   b. Asexual reproduction -- That type which does not involve the fusion of the sperm and egg.

   c. Sexual reproduction -- That type which involves the mixture of materials from two hereditary lines.

   d. Embryo -- An animal in the earliest stages of its development in the uterus.

   e. Fetus -- An unborn young of an animal of its latter stages.

   f. Albumen -- The white, thick portion of the egg.

   g. Ovulation -- The period in which the matured egg may be fertilized.

   h. Fertilization -- When the mature egg leaves the ovary and joins the sperm in the oviduct.

   i. Estrus -- A period during which sexual receptivity of the female to courtship and copulation is evident; commonly called "heat."

   j. Zygote -- A fertilized egg.

   k. Estrus cycle -- number of days from the beginning of one estrus (heat) to the beginning of the next estrus (heat).

   l. Gestation -- Length of pregnancy (Transparency V-1-C)

   m. Artificial insemination -- Depositing sperm in the female by unnatural means.

157 2. Anatomy and Functions of Male Reproductive System (Cattle) (Transparency V-1-A)*

a. Scrotum
b. Testes
c. Epididymis
d. Vas deferens
e. Spermatic cord
f. Prostate gland
g. Cowper's gland
h. Urethra
i. Semen
j. Penis

    1) Sigmoid flexure
    2) Sheath

3. Anatomy and Functions of the Female Reproductive System (Cattle) (Transparencies V-1-B,D&G)*

a. Ovaries
b. Oviducts
c. Uterus
d. Cervix
e. Vagina
f. Urethra
g. Clitoris
h. Vulva

4. Anatomy and Functions of Male Reproductive System (Poultry) (Transparency V-1-D)*

a. Testicles
b. Vas deferens
c. Cloaca
d. Papillae

5. Anatomy and Functions of Female Reproductive System (Poultry) (Transparency V-1-D)*

a. Ovary
b. Oviducts

    1) Funnel
    2) Isthmus
    3) Uterus
    4) Vagina

*Note: The functions of each respective reproductive system can be found in the Ensminger references.

6. The Reproductive Process
(Transparency V-1-C)

a. Heat period or estrus -- Time when the female will accept the male. The heat period is started by a follicle on the ovary secreting the estrogenic hormone responsible for symptoms of heat.

The ovary of an animal not in heat will form a corpus luteum responsible for secreting the hormone, progesterone, which maintains pregnancy.

b. Ovulation -- An egg discharges from a follicle. The release occurs near the end of heat or after the heat period. The egg enters into one of the oviducts where it may be fertilized if a viable sperm is present. After ovulation, the corpus luteum appears and secretes the hormone progesterone. If the egg is not united with a sperm, the corpus luteum atrophies, allowing another follicle to ripen and another heat period to occur. (Transparency V-1-F)

c. Fertilization -- The union of the sperm and the egg.

During the process of natural mating or artifical insemination, the semen containing the sperm is deposited within the vagina of the female. The sperm cells ascend the reproductive tract through the cervix, uterus, and into the oviducts. If the sperm cells are deposited at the proper time in relation to ovulation, sperm will unite with an egg in the upper part of the oviduct. The fertilized egg then passes down the oviduct into the uterus where it becomes attached to the mucous membrane. Here, the embryo receives nourishment and is protected until fully developed. (Transparency V-1-E)

d. How Reproduction in Poultry Differs from Livestock

Poultry reproduction is markedly different from the reproduction of mammals. The most obvious differences are that the egg is fertilized in the

159 infundibulum, supplied with nutrients, surrounded by a shell, and expelled from the body, while the fertilized egg in mammals remains in utero until birth. Also, in higher animals, reproduction is possible only after the ovum (female gamete) is fertilized or united with the spermatozoon (male gamete). In chickens, fertilization is not a necessary preliminary to egg laying; a hen can lay continuously without being mated.

e. Reproductive Failures in Livestock

Sterility may be due to a particular disease or a specific defect. Some of the common reasons for reproductive failure are:

1) Anatomic defects -- Cryptorchid, retention of the testes in the abdominal cavity. Scrotal hernia, lack of exercise, malformed penis, and periods of high temperature are other male defects.

   In females, the freemartin -- a sterile female born with a twin brother -- is an abnormality of which only about 10 percent are normal animals. Other defects include the absence of ovaries or uterine horns and closure of the cervix or other tubes.

2) Injury to genital organs.

3) Diseases of reproduction.

   a) Brucellosis
   b) Vibriosis
   c) Trichomoniosis
   d) Leptosporosis

4) Nutritional deficiencies.

5) Endocrine disturbances.

6) Genetic factors.

7) Artificial Insemination 160

a) Advantages

(1) Increases use of outstanding sires.

(2) It alleviates the danger and bother of keeping a sire.

(3) Makes it possible to overcome certian physical handicaps to mating.

(4) It lessens sire costs.

(5) Lessens costly delays through use of infertile sires.

(6) Helps control diseases.

(7) Makes it feasible to prove more sires.

(8) Creates large families of animal from same ancestry.

(9) Increases pride of ownership.

(10) Alleviates distance and time as limiting factors.

(11) Increases profits.

b. Disadvantages

(1) Requires skilled technicians.

(2) Accentuates the damage of a poor sire.

(3) Restricts the sire market.

(4) May be subject to certain abuses.

(5) Not fully practical to bring females in "true heat" at will.

C. Suggested Student Activities

1. Draw and label the male and female reproductive tract for cattle and poultry.

2. Outline the estrus cycle for the various classes of livestock including characteristics of heat period, ovulation, fertilization, and length of gestation.

3. Develop a plan of artificial insemination for cattle (schedule activity helpful in assuring conception).

4. Outline a vaccination schedule needed to prevent reproductive diseases in livestock and poultry.

D. Suggested Study Questions

1. Define all new terms found in this lesson.

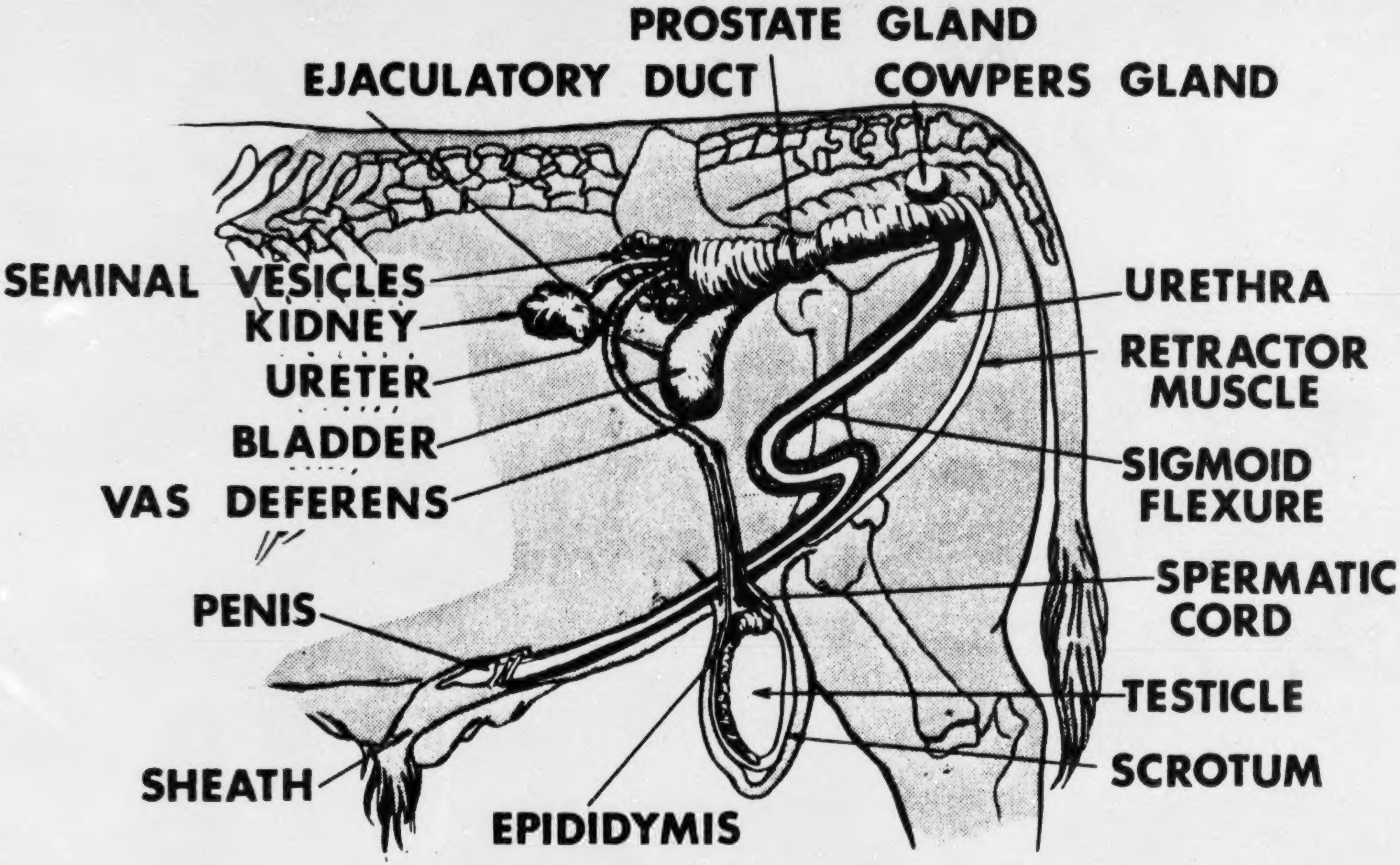
2. Draw and label the parts of the female reproductive system.

3. Draw and label the parts of the male reproductive system.

4. Describe the reproductive system of the chicken.

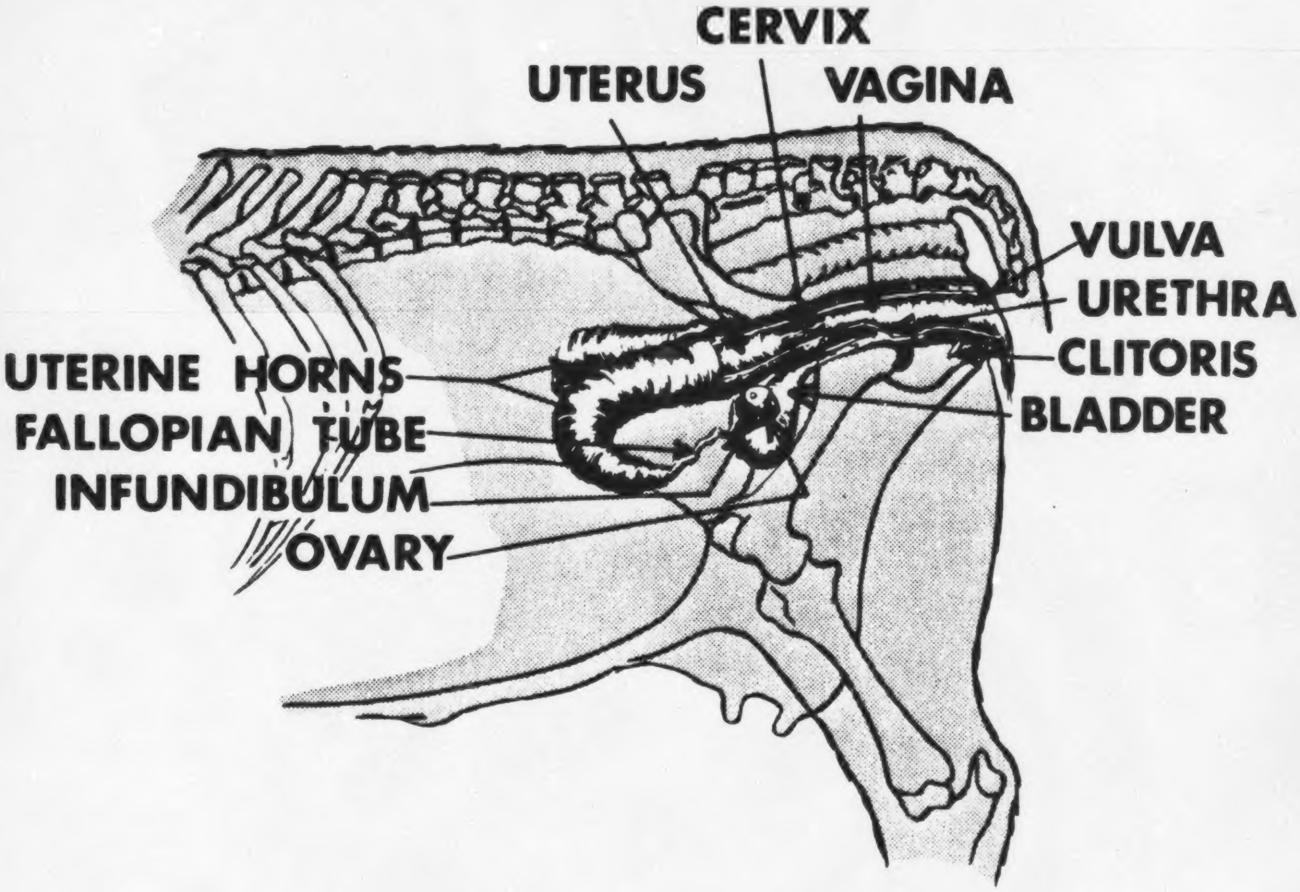
5. What are the advantages and disadvantages of artificial insemination?

6. How does one determine heat in animals?


PROSTATE GLAND
EJACULATORY DUCT
COWPERS GLAND
SEMINAL VESICLES
KIDNEY
URETER
BLADDER
VAS DEFERENS
PENIS
SHEATH
EPIDIDYMIS
URETHRA
RETRACTOR MUSCLE
SIGMOID FLEXURE
SPERMATIC CORD
TESTICLE
SCROTUM

MALE REPRODUCTIVE SYSTEM

Transparency V-1-A


CERVIX
UTERUS
VAGINA
VULVA
URETHRA
CLITORIS
BLADDER
UTERINE HORNS
FALLOPIAN TUBE
INFUNDIBULUM
OVARY

FEMALE REPRODUCTIVE SYSTEM

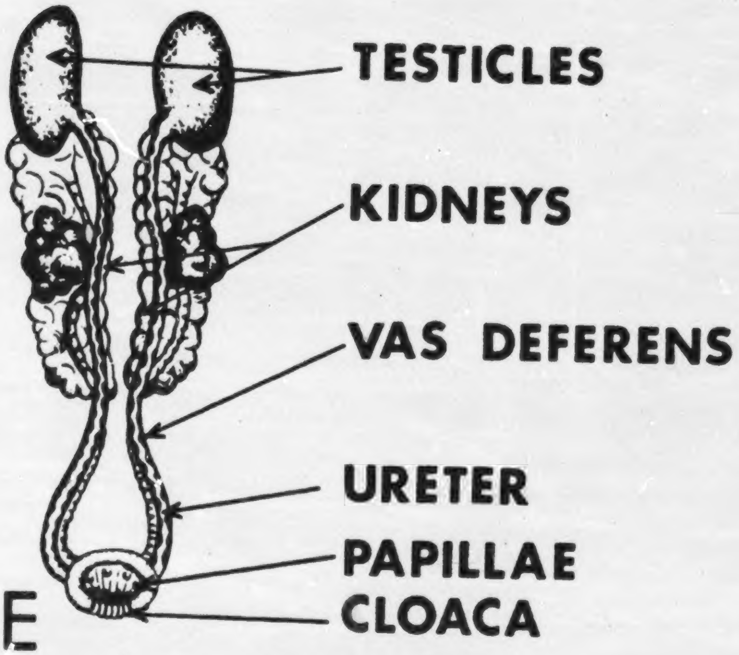
Transparency V-1-B

REPRODUCTIVE CYCLE OF LIVESTOCK

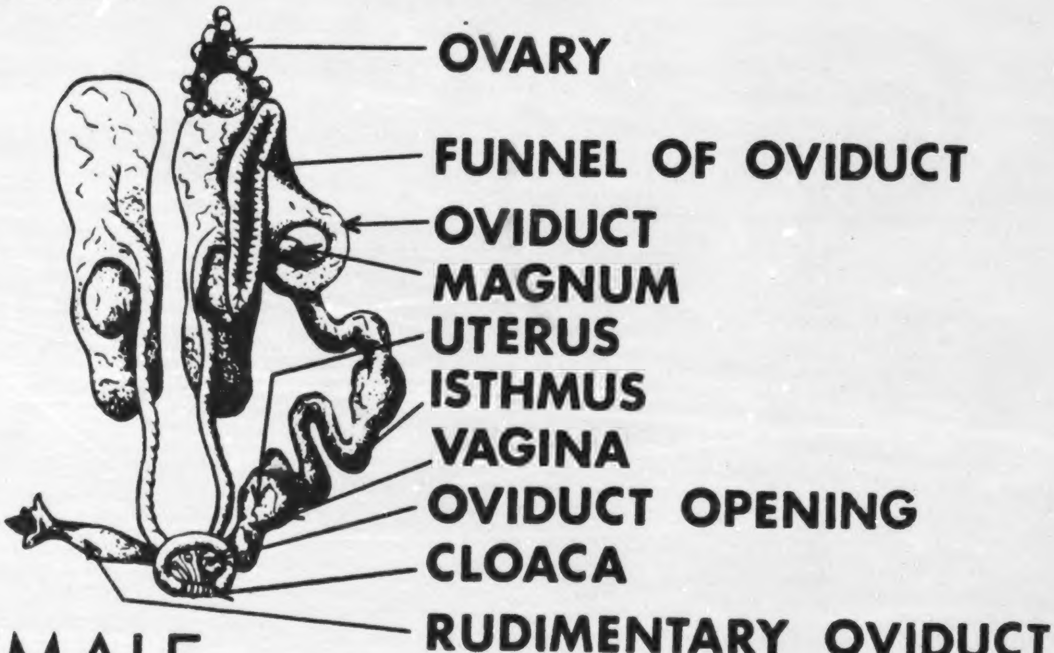
SPECIES	DURATION OF HEAT		DURATION OF HEAT INTERVAL (days)		TIME OF OVULATION IN RELATION TO HEAT	AVERAGE GESTATION PERIOD (days)
	RANGE	AVE.	RANGE	AVE.		
COW	8-30 hr.	14 hr.	18-24	21	14 hrs. AFTER END	281
SOW	1-5 da.	2-3 da.	18-24	21	NEAR END	113
EWE	1-3 da.	35 hr.	14-20	16	AT END	150
GOAT	2-3 da.	2½ da.	15-24	21	NEAR END	151
MARE	2-11 da.	6 da.	16-30	22	1 to 2 da. BEFORE END	336

Transparency V-1-C

POULTRY REPRODUCTIVE TRACTS


TESTICLES
KIDNEYS
VAS DEFERENS
URETER
PAPILLAE
CLOACA

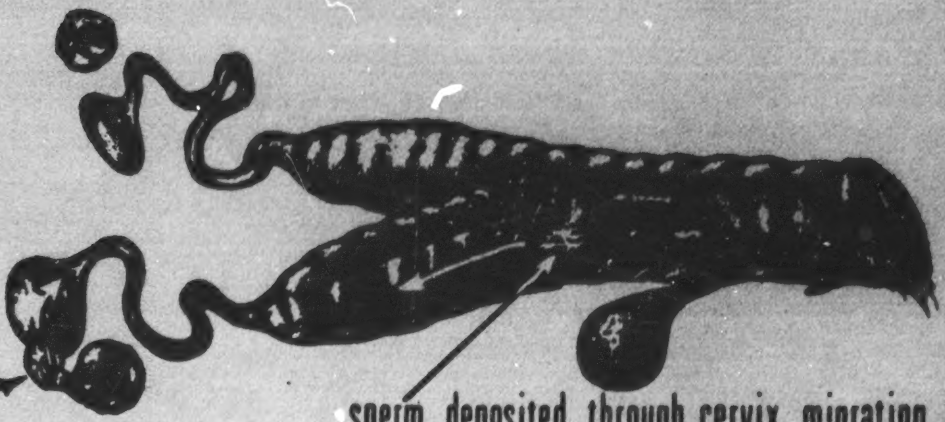
MALE


OVARY
FUNNEL OF OVIDUCT
OVIDUCT
MAGNUM
UTERUS
ISTHMUS
VAGINA
OVIDUCT OPENING
CLOACA
RUDIMENTARY OVIDUCT

FEMALE

FERTILIZATION IN CATTLE

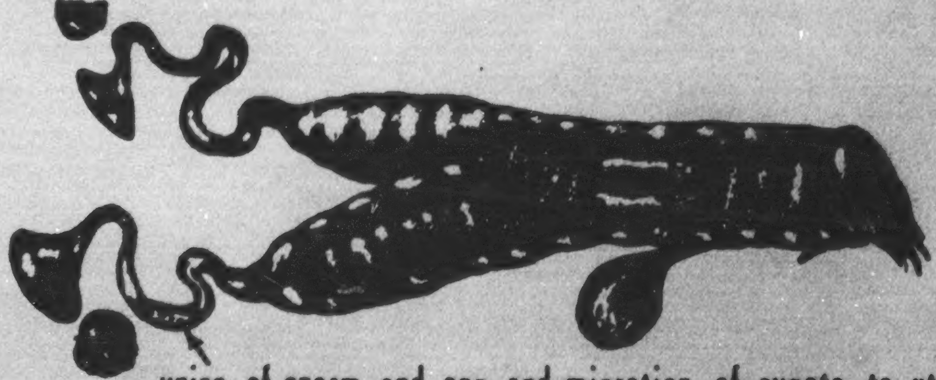
1.



egg passing through
infundibulum into fallopian tube

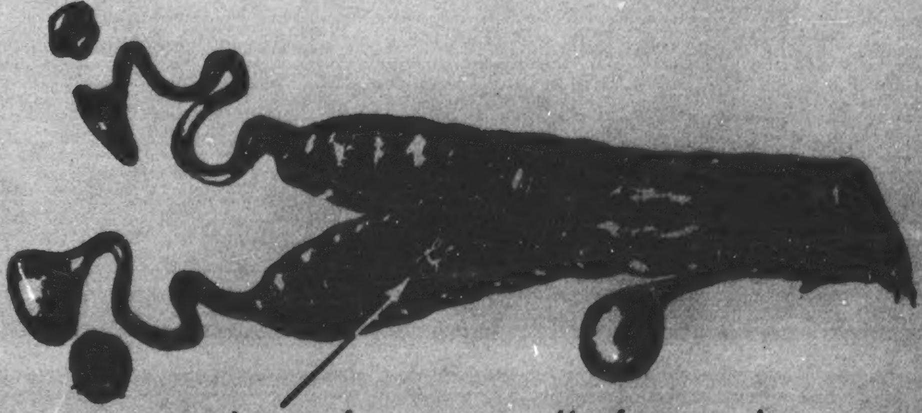
sperm deposited through cervix, migrating through
uteran horn into fallopian tube

2.



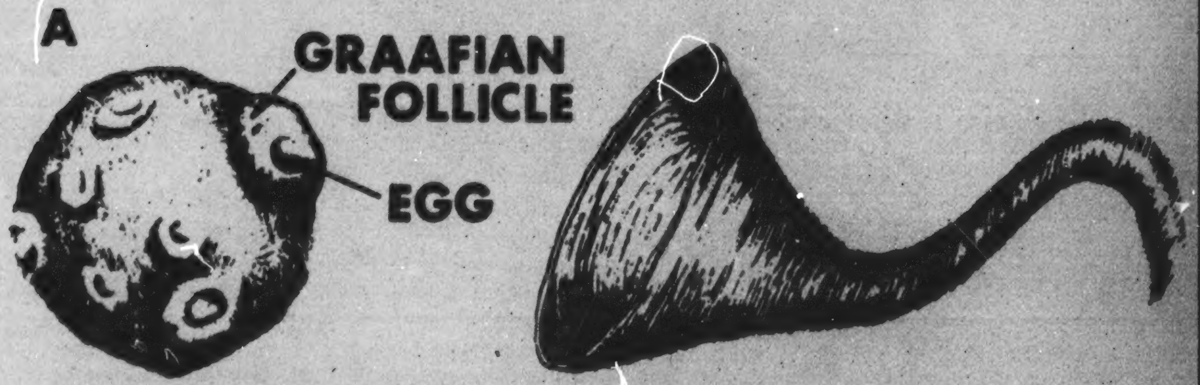
union of sperm and egg and migration of zygote to uterus

3.

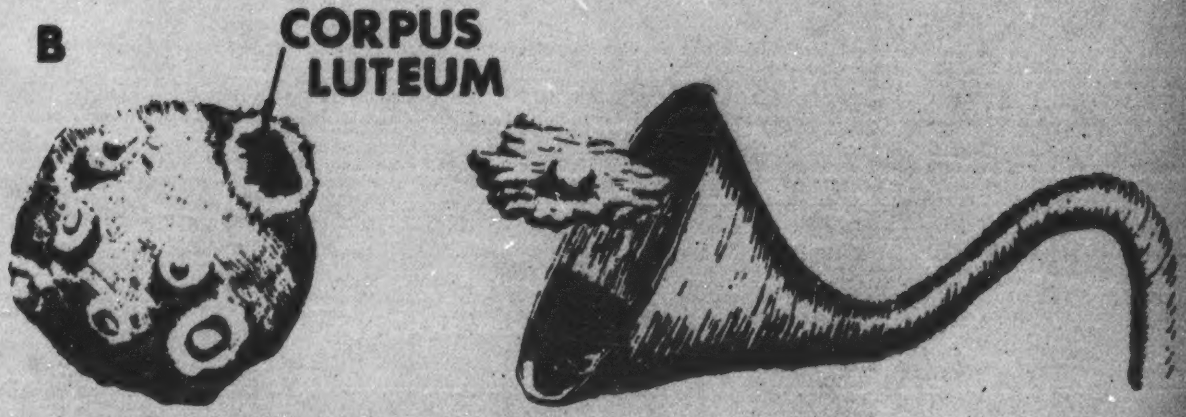


attachment of zygote to wall of uteran horn

OVULATION


A
GRAAFIAN FOLLICLE
EGG

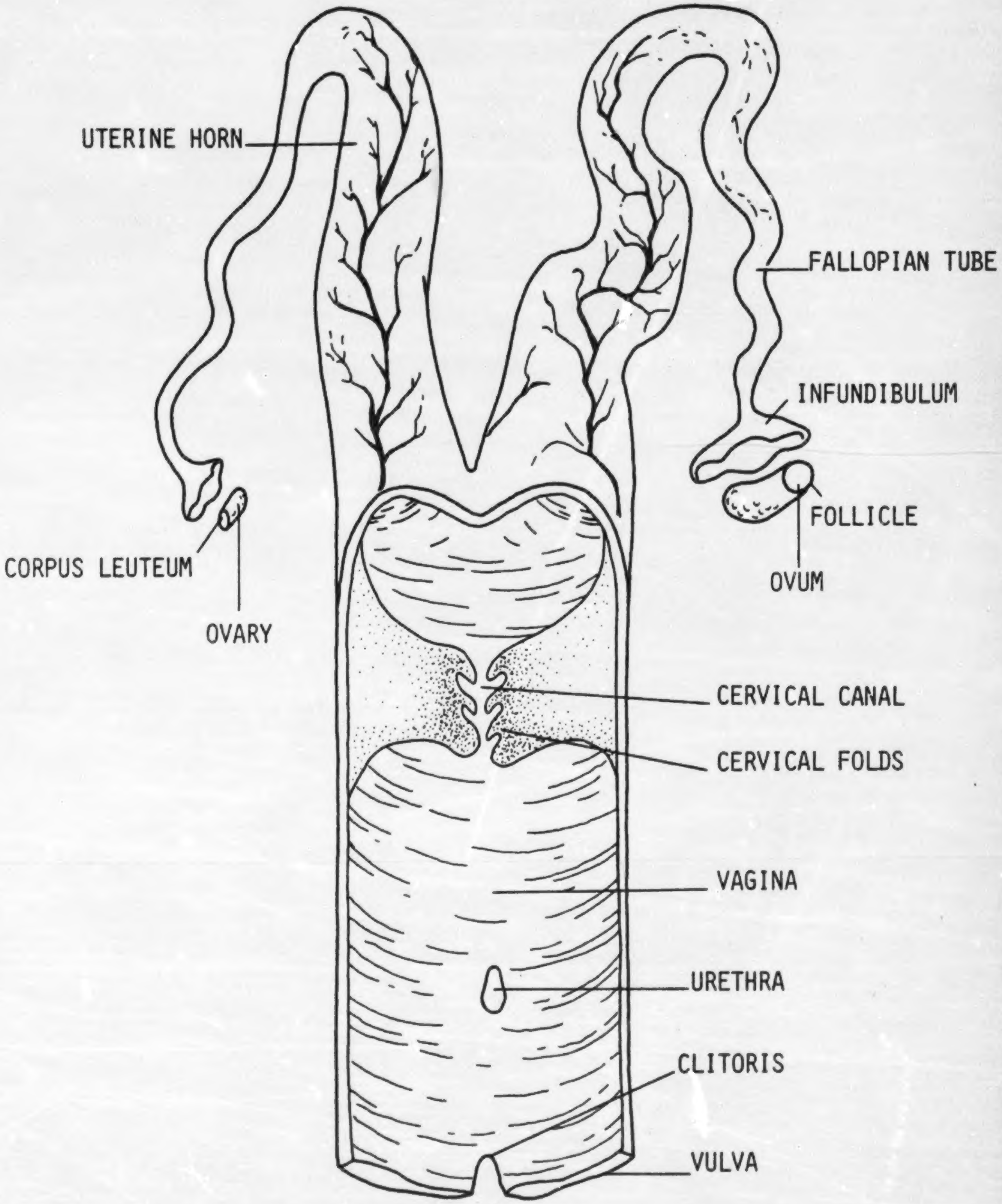
OVARY (DURING HEAT)


B
CORPUS LUTEUM

OVARY (NOT IN HEAT)

Transparency V-1-F

FEMALE REPRODUCTIVE TRACT


UTERINE HORN
FALLOPIAN TUBE
INFUNDIBULUM
FOLLICLE
CORPUS LEUTEUM
OVUM
OVARY
CERVICAL CANAL
CERVICAL FOLDS
VAGINA
URETHRA
CLITORIS
VULVA

Transparency V-1-G

INSTRUCTIONAL AREA: Animal Science

INSTRUCTIONAL UNIT V: Principles of Breeding Livestock

LESSON 2: Methods of Breeding Livestock

I. Preparation for Instruction

A. Student Objectives

1. Terminal: Explain the role of selecting and controlling mating for adaptation and type.

2. Specific:

a. List and define the systems of breeding.
b. Identify factors to consider when selecting a system of breeding.
c. Consider the advantages and disadvantages of various systems of breeding.
d.

e.

f.

B. Review Teaching Material

1. Ensminger, M.E. Animal Science. 7th. Edition, Danville: Interstate Publishers, 1977.

2. Ensminger, M.E. Poultry Science. 2nd. Edition, Danville: Interstate Publishers, 1980.

C. Special Arrangements

1. Pictures showing livestock from the wild to improved animals of today.

2. Arrange a field trip to visit and interview local livestock producers.

163 3. Overhead projector and transparencies.

II. Presentation of Lesson

A. Motivation

The many diverse types and breeds among each class of farm animals in existence today originated from only a few wild types within each species (briefly review the list of breeds for the classes of livestock). In cattle, through various systems of breeding, these evolved animals were especially adapted for draft purposes, beef production, milk production, and dual purpose needs. There is no one best system of breeding or secret of success for any and all conditions. Each breeding program is an individual case, requiring careful study.

B. Content Outline

1. Terms

   a. Purebred animals -- Animals which possess a common ancestry and distinctive characteristics. They are either registered or eligible for registry in the herd book of that breed. (Transparency V-2-E)

   b. Inbreeding -- The mating of animals more closely related than the average of the population from which they came. (Transparency V-2-C)

   c. Closebreeding -- The mating of closely related animals: sire to daughter, son to dam, and brother to sister.

   d. Linebreeding -- The mating of animals more distantly related than in closebreeding and in which the matings are usually directed toward keeping the offspring closely related to some highly admired ancestor, such as half-brother to half-sister, female to grandsire, and cousins. (Transparency V-2-A)

   e. Outcrossing -- The mating of animals that are members of the same breed but which show no relationship close up in the pedigree (for at least the first four or six generations).

   f. Grading Up -- That system of breeding in which purebred sires of a given pure breed are mated to native or grade females.

   g. Crossbreeding -- The mating of animals of different breeds. (Transparency V-2-B)

   h. Heterosis or hybrid vigor -- A name given to the biological phenomenon which causes crossbreds to outproduce the average of their parents.

   i. Complementary -- Refers to the advantage of a cross over another cross or over a purebred, resulting from the manner in which two or more characters combine or complement each other. (Transparency V-2-D)

   j. Progeny testing -- used to select breeding stock on the basis of their offsprings' (progeny's) performance.

2. Factors to consider in selecting the system and method of breeding.

   a. Climatic conditions -- Some breeds and crosses are more adaptable to certain weather conditions than others.

   b. Type of breeder -- The commercial breeder would use a different system from the one used by the breeder of purebreds.

   c. Personal preference.

   d. Markets -- location and type.

   e. The producer's knowledge of genetics.

   f. Area in which the producer lives.

   g. Size of operation.

   h. Age of animals when they are sold.

   i. Financing available.

   j. Goals of the producer.

3. Advantages and disadvantages of individual breeding systems.

   a. Inbreeding

      The purposes of inbreeding are to concentrate the inheritance and to fix desirable traits in a group of animals. Some disadvantages of inbreeding are that inbreeding decreases reproduction, vigor, survival rate, and growth rate.

   b. Linebreeding

      Less intense form of inbreeding -- does not offer the possibility of improvement or regression that inbreeding does.

Usually is the mating of animals that are both related to an outstanding animal and is not the mating of animals that are closer than half brothers to half sisters.

Example: Selected bull X half sister. Son of bull above X daughters of dam above. Linebreeding is successful only in herds that have a high degree of excellence and outstanding individuals as indicated by progeny test.

c. Upgrading

The purpose of upgrading is to improve quality, develop uniformity, and increase performance in the offsprings.

d. Crossbreeding

The two principle reasons for crossbreeding are to combine the desirable characteristics of two or more purebreeds to form a new breed or type which will have greater adaptability and to produce hybrid vigor.

Some disadvantages of crossbreeding are as follows:

1) Crossbred cattle are discounted on some markets.

2) Several pastures are needed.

3) Replacement heifers are needed.

4) Selection is more difficult.

C. Suggested Student Activities

1. Visit a livestock operation and study two or more generations of animals for the purpose of observing and evaluating the characteristics which animals transmit to their offspring.

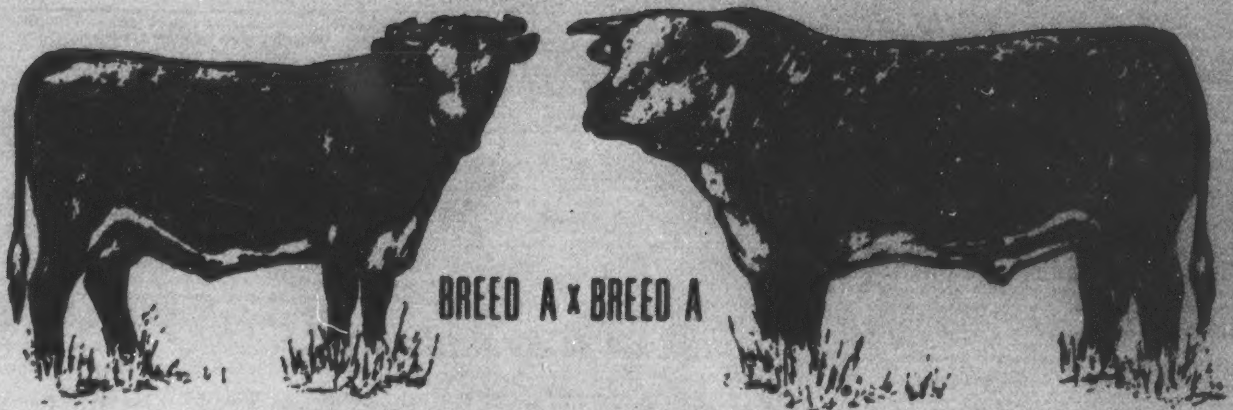
2. Prepare a possible plan of management for breeding stock of the livestock classes.

3. Prepare an acceptable breeding system for the popular classes of livestock and poultry in local area.

D. Suggested Study Questions

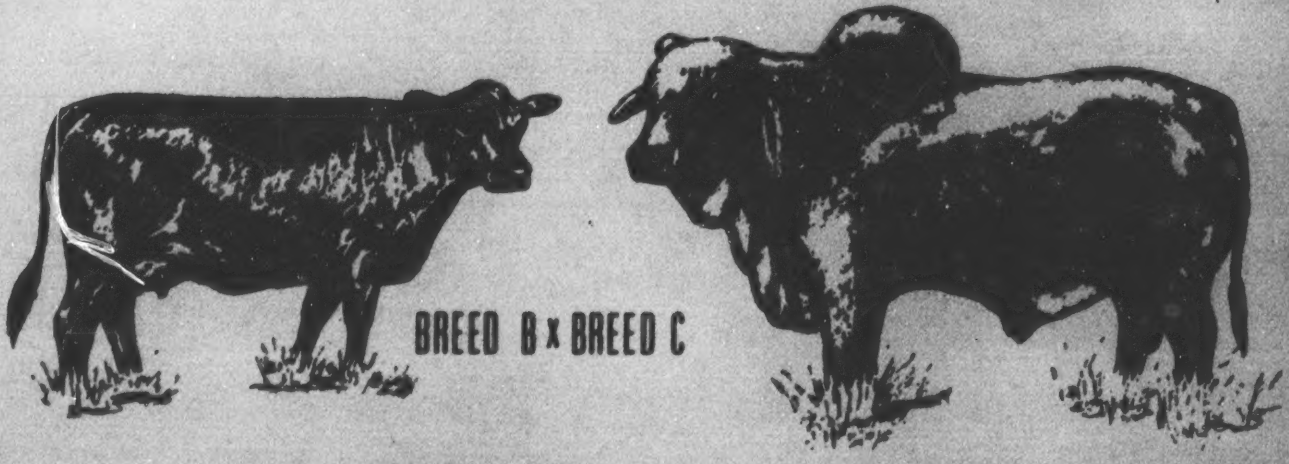
1. Define purebred animal.
2. Define hybrid vigor.
3. Define inbreeding.
4. Define closebreeding.
5. Define linebreeding.
6. Define outcrossing.
7. Define upgrading.
8. Define crossbreeding.
9. Define heterosis.
10. Define complementary.
11. Define progeny testing.
12. What is the most common type of breeding system in this area?
13. What are the most important factors in choosing a breeding system for this area?

SYSTEMS OF BREEDING


BREED A x BREED A

1 STRAIGHTBREEDING

- INBREEDING
- LINEBREEDING
- UP-GRADING


BREED B x BREED C

2 OUTBREEDING (Crossbreeding)

Transparency V-2-A

A COMPARISON OF SEVERAL TRAITS OF PURBRED AND CROSSBRED CATTLE

FIGURE 1.	BREED OR CROSS OF DAM AND SIRE				
	H×H	B×B	F_1×H	F_1×B	SECONDCROSS×SG
% PREGNANT	89.3	78.6	91.7	95.7	71.4
% CALVED	82.1	71.4	86.4	91.3	71.4
% WEANED	78.6	42.9	70.8	86.9	71.4

FIGURE 2.

BREED OR CROSS OF COW	MILK YIELD, Lb.*	PERCENT ADVANTAGE OVER			
		H	B	H&B	SECONDCROSS
HEREFORD	7.4				
BRAHMAN	7.6				
AVE. OF H&B	7.5				
SECONDCROSS (½A×¼B×¼H)	12.8	73	68	71	
F_1 (½B×½H)	13.4	81	76	79	5
AVERAGE	13.1			75	

*Uncorrected for age of cow.

H - HEREFORD A - ANGUS B - BRAHMAN

SG - SANTA GERTRUDIS

Transparency V-2-B

AMOUNT OF INBREEDING FROM VARIOUS MATINGS

MATING	OFFSPRING
BROTHER×SISTER PARENT×OFFSPRING	25% INBRED
½ BROTHER×SISTER UNCLE×NIECE NEPHEW×AUNT	12.5% INBRED
½ UNCLE×NIECE NEPHEW×½ AUNT	6.25% INBRED
COUSIN×COUSIN	3.125% INBRED

Transparency V-2-C

FEEDLOT RESEARCH OF PUREBREDS AND CROSSBREDS

FEEDLOT GAIN - 140 DAY TEST

BREEDING OF			AVE. DAILY GAIN, Lb.	ADVANTAGE FOR CROSSBREEDS
SIRE	DAM	CALVES		
H	H	H	2.36	(2.20 BASEPOINT)
B	B	B	2.04	
H	B	F_1	2.43	10%
B	H	F_1	2.44	10%
F_1	F_1	F_2	2.16	3% LOSS

H - HEREFORD B - BRAHMAN F_1 - - (½H×½B)

Transparency V-2-D

A COMPARISON OF TRAITS OF PUREBRED AND CROSSBRED CATTLE

FIGURE 3.

MATING INVOLVED SIRE×DAM	PERCENT LOST		
	CONCEPTION TO BIRTH*	BIRTH TO WEANING**	TOTAL
B×B	3.0	20.5	23.5
H×H	2.1	2.2	4.3
B×H	0.0	4.0	4.0
H×B	0.0	4.7	4.7
B×(½B×½H)	0.0	0.0	0.0
H×(½B×½H)	0.0	0.0	0.0
A×(½B×½H)	0.9	0.9	1.8
A×(½A×¼B×¼H)	0.0	0.0	0.0

*=Calves lost as percent of cows pregnant

**=Calves lost as percent of cows that calved

H - HEREFORD　　A - ANGUS　　B - BRAHMAN